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Photograph by Gen. H. F. Robinson

Beating the Ceremonial Drum in the Kiva, Hopiland.

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UNDER TURQUOISE SKIES

Outstanding Features of the Story of America's Southwest from the Days of the Ancient Cliff-Dwellers to Modern Times

BY

WILL H. ROBINSON

Author of "The Story of Arizona," "The Man from Yesterday," "The Golden Palace of Neverland," "Yarns of the Southwest," etc.

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TO

GRACE PERLEY ROBINSON

FELLOW-TRAVELER UNDER TURQUOISE SKIES

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FOREWORD

HE best thing about that patriotic slogan, so deservedly dear to the hearts of railway passenger agents and automobile salesmen, "See America First," is that nowadays many of us are really doing it. It was more than an educational achievement when we learned that scenery can be something else than a coupon on the end of a Swiss Inn menu; and it makes for a swelling of the national chest to suspect that there are spots in the United States that have as intriguing historical associations as may be found in Italy or Egypt.

Now there is that fascinating section of America known as the Southwest! You see I got to it rather quickly! It's like the book agent who plants his foot in the crack of the hesitant door: he will have his way. Only here there is this important difference, in the book-agent sense the Southwest has nothing to sell but good will. He is the host and he comes right out into the front yard and asks the world to drop in and share his hospitality.

And, as there are other attractive yards in our country—something we are very glad to admit—perhaps it would be as well to give you the exact address of our Southwest so that when, as in your train or your Rolls-Royce or flivver, you make the rounds, you will not miss the turn when you reach the Enchanted Land.

In a general way it may be said that the Southwest is New

Mexico and Arizona with a narrow strip added on the north and east. The boundary to the north should be pushed up far enough to include the San Juan River country with its wonderful cliff dwellings; the east line cuts through the Llano Estacado. Westward the district of our story might properly take in the California desert up to the Coast Range, but for the sake of unity we shall set up an arbitrary border at the Colorado River.

We, who have spent much of our lives in the Enchanted Land, wonder if in all the world there is another spot that has a greater scenic and historical lure. The Grand Canyon, the Painted Desert, the Fallen Petrified Forests, the Prehistoric Cliff Dwellings, the Great Pyramidal Community Houses of the Pueblo Indians, the Inscription Rock of the Conquistadores, the Spanish Missions—titles for a thousand stories—words to conjure with!

Every country has its personality and, to a certain degree, impresses that personality upon its inhabitants just as, in turn, the people help make up the atmosphere of the country.

The Southwest was not a land of ease for its pioneers. Crossing its deserts in summer they faced a very inferno of heat; in cutting their way through high mountain passes in winter they encountered a cold but little short of arctic. They experienced droughts; they were lured to fearful sufferings by mirages; they were tormented by sandstorms. They found it a land of poisonous insects, venomous snakes and savage Indians. In most sections there was not rain enough to produce a crop, and what plants there were growing wild, that might have yielded them food, were either unknown or hidden from view.

Each man was thus tested, and in the testing the weak—

the counterfeit—succumbed; the strong overcame. Trails were found or made through seemingly impossible country. Plants as forbidding as the bristling cacti were found to bear edible fruit. They discovered one variety of cactus that carried water enough to sustain life. Poisonous insects and reptiles were easily ignored or eliminated. Savages were overcome. Irrigation took the place of rainfall, and luxuriant oases were created in the very heart of the desert.

It was in enforcing tasks like these upon its early denizens that the Southwest broke the weak and developed the best in the strong. It made military leaders like Espejo and Crook, pathfinders like De Anza and Kit Carson, great missionaries such as Padre Garces and Bishop Kendrick, Indian chiefs as wise and kindly as the Pima, Antonio Azul.

There were, as well, hundreds of plain, common twenty-four-hours-a-day heroes developed, men who were taken for granted by their fellows and posterity—sheriffs, who made the law respected; stage drivers, express messengers and freighters, who kept transportation moving in spite of Apaches, Jornados del Diablo and alkali water; and none did a bigger work in a bigger way than the railroad and canal builders—from chief engineer to shovelers. All were tested in the crucible of the Southwest and found to be pure gold. And then there was our chuck-tent cook, Fon Choy! There are not words enough in the dictionary to tell all his excellencies.

In those pioneer days no man was "free," but bound in honor by sacred bonds to serve his fellows if he were to have a part in the country. Still less were men "equal." It was a land with an aristocracy. Not of birth, except in the biological sense where a man inherited not a name but char-

acter from his sires. It was an aristocracy of personality and character, cool nerve and self-control. If one didn't measure up, he didn't belong to the peerage, but to the herd. One might have a few carefully selected vices and still "belong," but they must be noble ones. And the environment wasn't conducive to the longevity of the two-gun man on the wrong side of the law.

Many of this sort of men I have known intimately and, as well, pioneer women equally noteworthy. Coming into the country in '86 as a boy of nineteen, I saw the old order give way to the new. That was the year Captain Lawton rounded up the last raiding Apaches; then the stage coaches were still competing with the Iron Horse. I had a part in building the first railroad to Arizona's capital and helped transform primeval desert into fruitful farms. I have seen bad men shot and good ones sorely tested. Gambling of course was wide open and the wildest imagination never dreamed of a saloonless Southwest.

The Spanish Conquistador, Don Francisco Vasquez Coronado, came to the Southwest looking for treasure. He failed to find it and returned to Mexico a broken man. It was not the fault of the country, but his own. Treasures were there, but having eyes he saw not. Eager for precious metals he passed by copper deposits that would pay a national debt; seeking a location for colonization he counted as of little worth agricultural land equal to that of the Nile Valley. And these are but two of many of the Southwest's treasures he failed to find.

Of all the things with which kindly circumstance has blessed me, I count among the best the friendship of men who hold keys to doors that guard secrets of Things Worth While

and who, out of the kindness of their hearts, opened them for me.

I have stood beside a genial old gentleman with a shiny bald head known to the world as the Great Geologist, while he said his "Open Sesame" before the door of the rocks. I have listened to a pleasant-voiced, smiling little man as, with potsherds from a buried city in his hand, he created anew those strange pyramidal apartment houses of a thousand years ago, and peopled them with copper-colored, picturesque folk who danced to weird songs and the beating of drums.

I learned from him that the Southwest even in those far distant times was testing men; that it was the worthy who became the cultured builders of houses, while the vicious degenerated into the bloodiest of savages.

I spent many a golden afternoon with a friend who with a sheaf of brushes took colors from little tubes and not only transferred to canvas a picture of the scene that was before us, but gave it a psychic quality which when it was done, I perceived was the one vital thing about it. It was he who touched my eyes and made me see in the world about us beauties of outline that I had never before felt, and a richness of tints and colors I had never before suspected.

Then there were botanists who showed me how the Southwestern deserts and mountains tried plants even as they tried men, and only the superplants, the heroes, had endured.

Most of the fascinating habits of beasts and birds I learned from friends of fur and feathers direct. Naturally distrustful of blundering man, if one possesses patience enough, in the end he will find many of them as eager to talk of themselves as is a fond father to tell of the precocity of his first-born.

Readers, gentle and otherwise, if you care for this sort of

thing—are interested in meeting the kind of men I have been talking about, care to learn some of the secrets of the Things Worth While that exist "Under Turquoise Skies," come and retravel with me the ancient trails.

There is one advantage you have when you do your itinerary with a cicerone through the pages of a book rather than by personal contact: you need to listen to his chatter only so long as he can interest you. When he becomes tedious you can shut him off as quickly as you can the too prolix gentleman on the radio.

I have a presentiment right now I am approaching the danger line of wordiness with this foreword. So, friends of the printed page, let's quit talking about what we are going to talk about and be on our way.

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THE SOUTHWEST'S ABORIGINAL INHABITANTS

UNDER TURQUOISE SKIES

CHAPTER I

AMERICA'S FIRST FAMILIES

ONE thing that makes the study of the native races in southwestern America so interesting to most of us is, perhaps, because in them we see ourselves in another stage of our own advancement toward civilization. Not that I mean to imply any such absurdity as that any of us are as yet really civilized. Possibly that is what intrigues our interest all the more in studying these people; as one barbarian analyzing another we have a sort of horrified curiosity in observing the points where our mental and sociological perimeters touch.

It also interests, though it does not flatter us, to learn that at a time, say fifteen or eighteen hundred years ago, when the ancestors of those of us who especially pride ourselves upon our superior Nordic blood were living in tents, wearing the skins of beasts (an atavistic retention of which habit may still be noticed among some of us), worshipping Thor and Wodin and glorying in sanguinary conflict, the forebears of one group of our copper-colored friends dwelt in stone-built apartment houses, wore artistically fashioned garments of buckskin and beautifully woven and dyed cotton cloth, tilled the soil, loved the arts of peace and had a really definite amount of culture.

In the past it has generally been taken for granted that in order to study history one must have before him a printed or written page; now we realize what ought to have been obvious from the beginning, that history is written whenever a people, after playing their little game of life and passing on, leave behind them evidence of any sort showing the kind of folk they were, and hinting of what they did, or tried to do.

The weapons of a people tell one story; their dress, ornaments, tools and fetishes, if they possessed such things, another. Their nests, or caves, or other form of habitation hold a world of suggestions concerning them.

All through the Southwest we find records of people who, after living there for centuries, disappeared so long ago that the traditions of them were all but obliterated even in the minds of the most intelligent of the native races found there when the Spaniards first entered the land. And while to-day a few exceptional tribal groups, about whom we shall have more to say later, have vague traditions concerning the ancients, most of the local Indians when questioned about the many ruins of the prehistoric culture which dot the land, shake their heads and mutter, "Ho-ho-kum," or its equivalent—"The Forgotten Ones."

The Sherlock Holmes of literature as a real detector of crime has been more or less discredited, but when it comes to reading the history of a forgotten people from the meager evidence that they left after them, the modern archæologists fairly outdo the astute friend of Doctor Watson at his own game.

In an area including the west two-thirds of New Mexico, the east half of Arizona and the southern portions of Colorado, Utah and Nevada, there are literally thousands of ruins

in deserts and mountains, in caves and in the open, some built with walls of adobe, some with stone, all having unmistakable marks of being the remains of structures that were used in a variety of interesting ways by humans.

In certain of the caves are to be seen stone-sided bins in which, covered up by the dust of centuries, have been found corn still adhering to tiny cobs, and as well, baskets, beads, sandals of plaited yucca leaves and the bones of humans.

Other caves are divided into rooms with partitions of carefully selected stones set in adobe mortar and plastered. In some instances these dwellings include but a few rooms, but in a number of very notable examples, like that of the Cliff Palace in Southwestern Utah, a large grotto would contain a veritable city in miniature, with the houses, some of them three and four stories in height, all adjoining one another; or, to express it in another way, the whole town would be but a single house with an amazing number of apartments. Most of the cubicles show use as living rooms, but besides them there are granaries, towers and galleries. The living rooms have little fire pits for cooking, stones for grinding corn and there are openings in the walls which combine the purposes of doors and windows. Near the front, in all the more pretentious cliff cities, there are found underground, cisternlike chambers, covered with the usual roof of poles and brush, which undoubtedly were used for ceremonial purposes, and are designated by archæologists as "kivas," the name used by modern Hopi Indians for similar apartments.

Equally interesting are the ruins of human habitations in the open. The most primitive of these are simply shallow basins, or holes, dug in the ground to the depth of two or three feet, with walls of adobe extending above the surface of

the ground high enough to give head-room, and covered with poles and brush. There are also found dwellings with walls of masonry, containing all the way from three or four to fifty or more rooms. These buildings are of one story, and partially surround a plaza.

Photograph by courtesy Geo. L. Boundey

RUIN OF CASA GRANDE—Built by the prehistoric canal builders of the Gila Valley, Arizona.

Still another type of building, of which even the ruins are quite tremendous, excites one's admiration and curiosity quite as much as do the most pretentious of those in the cliffs. Here living apartments for an entire community are included in one large tenement that might contain from three hundred to over five hundred rooms.

In the mountains these great edifices would be constructed

of undressed stones laid in clay mortar; in valleys where stones were not available, adobe would be the material used. Some of the buildings in the mountains in shape roughly approximated a widened horseshoe; others in the highlands, as well as those in the valleys, had rectangular ground plans with a pyramidal elevation, and were flanked with lesser buildings.

Sunk into the ground of the plazas in many of the pueblos one finds several of the same underground, cisternlike kivas already mentioned as features of the cliff cities.

In many of these ruins, both in the cliffs and in the open, have been found a variety of interesting articles. Those made of stone include *metates* (grinding stones), axe blades, knives, arrow and spear points, pipes and the like. In pottery there would be cooking utensils, dippers, ladles, mugs, bowls, vases and water jars. Some of these would be very crude, others well finished and ornamented with artistic designs painted on them in various colors, and well fired.

Many baskets, too, have been found in a variety of shapes and sizes. There are, also, such wooden implements as shovels and planting sticks. Rattles made of gourds and deer hoofs are not infrequently uncovered, as well as flageolets manufactured from a sort of bamboo, also remnants of drums, dolls and ceremonial masks.

Beans and squash seeds are much in evidence, and bones left from a turkey or venison dinner. Bits of wearing apparel include parts of kilts, loin cloths, head and breast bands made of woven cotton or yucca-fibre cloth, and artistically dyed in various colors. Then there would be such objects of personal adornment as beads and pendants and various works of art carved from stone in the forms of birds and beasts and

humans—articles evidently prized as amulets, fetishes or charms.

That these primitives were skilled in the art of irrigation, as well as in agriculture, is shown by indications of storage dams in the canyons in the mountains, and by irrigation ditches leading from mountain streams to little patches of fertile lands.

In the broad, flat valleys of the Salt and Gila hundreds of miles of large, well constructed canals have been traced and mapped.

This, then, is the sort of evidence our scientists had to work upon, or, to put it another way, these were the shattered pieces of tiles that might be put together to form a complete mosaic.

CHAPTER II

IMMIGRATION

It would make too long a story to trace in detail the processes of the archæologists working in the Southwest in reaching their conclusions. It must be remembered that nothing should be taken as final. In spite of what we have said about their Sherlock Holmes methods, these scientists make no claim to infallibility. Working independently and in separate fields, unearthing widely differing sorts of evidence, it is not strange that occasionally their conclusions are considerably at variance. However, to-day, by comparing theories, eliminating those now found to be untenable, and harmonizing others, the story continually grows more coherent and unified. Yet no one knows as well as do these archæologists, themselves, that new discoveries may easily call for still further alterations in the tale of these primitives.

The questions, of course, first to be solved were—just who were our Southwestern aborigines, what were their race and color, where did they come from, what finally became of them?

Up to the time our investigators took hold of the question, popular speculations as to the origin of these people were both wild and fantastic. They were folks who evolved from lower animals right here in America. They were white men —Nordics from the Baltic! They were an extinct race of dwarfs! They were descendants of the inhabitants of the

fabled island of Atlantis! They were Phœnicians, whose fragile barks had carried them across the Atlantic! They were Welshmen! They were a remnant of the lost ten tribes of Israel!

The truth, of course, is that they were Indians; but in thought, habit and custom they developed into very different sorts of people from the Apache, Navajo or Ute. They were not all of one tribe or language, and different groups doubtless varied considerably in the way they looked, dressed, and did things, and in their general cultural advancement.

However, when we compare them with nomadic or camp-dwelling tribes, the similarity between the various groups composing them was far more notable than any differences. They were all sedentary, living in houses in more or less isolated units, or in communities, and their chief source of food supply was their gardens. While they varied somewhat in size, for the most part in bodily structure they were similar to the Japanese, perhaps a little taller. In complexion, we may imagine, they came somewhere between the dark-skinned Pimas and the Chinese.

It is fairly well agreed by most scientists that all of our American Indians are descendants of Asiatics—Mongolians—the first of whom came to America from Siberia across the Behring Strait or along the chain of the Aleutian Islands before or soon after the cold of the last Glacial Age began to abate.

These early pioneers must have included bold and adventurous spirits who were fishermen as well as hunters, who had already learned how to make and use small boats, and had the skill and daring to go to sea in them. Storms may have driven the first of the migrants to the New World, and

once there, finding a wonderful country to the south, salubrious and well stocked with game, they would have no desire to return to Asia except to bring back kinsmen or friends.

We may imagine that isolated small groups at different times covering many centuries may have made the crossing. Then the migration must have ceased, for the fact that nowhere in America do we find evidence that our aborigines knew anything of bronze or other later cultural discoveries of man would indicate that connection between the continents ceased in Neolithic times. This suggests that natural geological conditions in that early time were decidedly more favorable for passage between the continents than they were later.

That Asiatics rather than another race were the ancestors of the Amerinds, as the scientists call our American Indians, is substantiated by much evidence. Although the Indians were and still are divided into many tribes speaking many languages, their physical and mental similarities, from the Eskimos south to the natives of Patagonia, show them now to be amalgamated into essentially one sort of people. And in all their basic characteristics, including range of color, peculiarity of hair and eyes, prominence of cheek bone, hollowed-out upper front teeth, and psychological reactions, they closely resemble types that have inhabited eastern Asia for countless centuries, and are still found in many parts of Siberia, in Mongolia and in western China.

The type, also, is seen in the Philippines, and occasionally in Japan and Korea. So strikingly similar are all these people that their relationship is wholly evident.

This does not imply that there may not have been migrants

from other lands to the Americas in prehistoric times. The probabilities are that there were, but their numbers seem to have been so small in proportion to the Asiatics that their blood strains were absorbed by the major race.

It has been suggested by ethnographers that during glacial times there might have been a connection between Greenland and Europe, and that certain white men may have reached America in that way.

Another theory that has much weight of evidence back of it is that various small groups from the Polynesian Islands reached America in their well-built canoes. This would be at a considerably later date than that of the first Asiatic migration, as there seem to have been peoples in America quite as early as in Polynesia.

In seeking further to determine just how long ago it was when this migration stopped one has to think largely in approximations.

Dr. Byron Cummings, of the University of Arizona, one of the leading archæologists in America, has made an intensive study of the ruins of Cuicuilco, twelve miles from Mexico City.

Here he found a great mound of earth in the form of a truncated cone, faced on the outside with undressed stones and, on the top, ruins of altars. There is evidence that has convinced Dr. Cummings and other eminent scientists that this was first used as a place of worship by Amerinds from eight to ten thousand years ago, or from two to four thousand years before the great Egyptian pyramids were built! The age was arrived at by starting with a lava flow that covered the ruin two thousand years ago, and working downward through layer after layer of the slowly accumulated

dust of centuries. At the floor of each of these various layers were found artifacts of peoples of slightly differing culture, but all showing them to be of superior mental and artistic habits. At all levels, even the lowest, were found remains of well made pottery, and figures of animals, faces and human bodies in terra cotta, all most remarkably well done.

An interesting thing about these figurines of humans is that while save for loin cloth they are innocent of apparel, the images of the ladies show the hair carefully arranged and necklaces about their throats. This is quite as it should be. Neither convention nor inclement weather called for clothing, but a budding esthetic desire for beauty on the part of the aboriginal belles was indicated and expressed in the personal adornment of these little terra cotta figures. They were well started on the upward path toward things worth while.

If humans were building temples and making superior pottery in Mexico eight or ten thousand years ago, they must have reached the continent considerably before that time.

What seems to be further evidence that there were humans in America at a period much earlier than has been heretofore considered probable was also unearthed by Doctor Cummings, in our own Southwest, in the fall of 1926. On the bank of Whitewater Wash, fifteen miles northeast of Bisbee, Arizona, the skull of a mammoth was found two feet below the surface of the ground. After this discovery was made, further digging nearby uncovered, at a depth of eleven feet, crudely fashioned but unmistakably human-made, hand-hammer stones and stones used in dressing skins.

At the Empire Ranch, about sixty miles southeast of Tucson, in a similar stratum of earth, at a depth of about fifteen feet, there were exhumed the bones of two humans.

Both of these finds were uncovered by Doctor Cummings working with students from the University of Arizona.

Other items of evidence, that certain archæologists now believe indicate beyond a doubt that there were humans in North America as early as the Pleistocene, who were the contemporaries of the giant bison, the mammoth, mastodon and sabre-tooth tiger, have been unearthed near Folsom, Union County, New Mexico; near Frederick, Tillman County, Oklahoma, and along Lone Wolf Creek, in Mitchell County, Texas. At the Texas location arrow heads were found in intimate association with an extinct species of bisons; arrow heads at Folsom were discovered among the bones of the great bison and a deer-like animal, both of the Pleistocene; and in a gravel pit near Frederick, grinding stones and arrowheads were dug out eight feet and more beneath the bones and teeth of a mammoth.

These people did not come in solid bands, like an army or navy would move, but a few at a time. We must also imagine various degrees of culture among them, for there must have been as many, or more, differences among human groups then as now. Also, we need not think because these people were yellowish-brown and came from Asia that they were culturally inferior to any whites who may have been in western Europe at that time. The contrary is probably nearer the truth. As late as the sixth century, A.D., there was a higher social culture in China than in Europe.

While tens of thousands of years had already passed since man had begun to emerge from the ranks of the beasts, even the most advanced of these migrants, when they first arrived in this continent, had but barely started on the long road toward knowledge. Their weapons, probably,

included wooden clubs; a stick sharpened at one end, or perhaps with a pointed bone or stone attached; a stick for throwing long darts; a stone, split or chipped into a sort of a knife; and perhaps a sharpened bone for a dagger. They kindled fire with flints or with the use of a wooden drill.

After the first of these primitives reached the Southwest they may have roamed over the deserts and mountains for centuries, even millenniums, advancing culturally but slowly, but still advancing. It was yet the babyhood of the human race. But while a baby seems to learn but little, and that apparently very slowly, possibly he is really acquiring things faster than at any later period of his life.

Some considerable time, perhaps, after aborigines in the valley of Mexico began to build houses, a group of people, culturally above the average of the wholly savage, began to make semi-permanent homes along different rivers in what is now known as Arizona and New Mexico. Many archæologists believe that one of the first of these settlements may have been on the watershed of the San Juan River.

CHAPTER III

CAVE AND CLIFF DWELLERS

IN the Southwest, at the time of which we are writing, although there easily may have been on the average a little more rain than there is to-day, climatic conditions probably did not differ very widely from what they are now. The low-lying desert sections were lands of pleasant winters, but torrid summers; in the mountains, while the summers were salubrious, the winters were quite cold. Favored spots harbored game enough, but compared with the prairies where the buffalo herded, the Mississippi valley with its great variety of wild life, and Southern Mexico and Central America, with their luxuriant vegetation and abundant fauna, it must have been considered by our aborigines as a rather barren country, and there was probably little competition among nomadic tribes for exclusive hunting rights.

As a starting point, it may not be far out of the way to assume that our first permanent settlers were peaceable folk attracted here by the fact that it did not require perpetual warfare with more savage tribes to secure tenantry.

Still, stimuli to achievement were not lacking, for even though they were not at first harried by the mere belligerent tribes surrounding them, they were always faced with the conflicts incident to winning a living in a not-too-fruitful land.

To procure food our aborigine killed desert rats and

squirrels with a club; robbed birds' nests, both of the eggs and the young; used grass seed for cereals, and secured his vitamines from wild berries, roots and the tender growth of plants. For clothing, as we have already indicated, he used skins of beasts, and had little shelter except that obtained in inclement weather from trees, caves, or from projecting rocks.

BASKETRY

One day something happened, and while commonplace enough, through the intelligence of an observer a great thing was made of it. When off on a hunting trip or other excursion in an arid land, drinking water must be carried if great discomfort is to be avoided. For a canteen John Aborigine carried a gourd, held in a roughly made net of yucca fibre. One day the gourd broke and John found that the net made an admirable carrying receptacle for a quail he had just killed. When he got home his wife, the clever Jane Aborigine, said that a game-bag (the word probably was coined right there) was just what he needed, so using a finer mesh than that of the old gourd container she wove him a new bag, and all the neighboring women saw and wondered, and those that were skillful enough made similar bags for their husbands.

Some twenty years after, perhaps, Jane's daughter Mary, who, while she was rather shiftless, was clever like her mother, not wishing to take the long walk into the hills to obtain yucca fibre tried to make a bag of some stiff willows from a bush growing in the canyon bottom. It was a hundred per cent failure as a game bag or net, but as a basket it was a wonder, and behold, a new industry was started!

The appearance of the basket in the tribe naturally caused

a great furor. When she showed it at the Ladies' Guild, or its primitive equivalent, there were the usual number of criticisms and catty remarks made by ancient conservative members, as is apt to be the case when a radical departure is made from the established order of things, but the new creation was too useful not to be generally adopted.

As time went on, its shape was modified to meet different requirements. Fashioned like an open sack, it was carried on the back and found convenient in gathering grass seed; a smaller size of bowl shape was used to hold food; flattened somewhat, it served the purpose of a cooking utensil. A basket to cook in? To be sure. One of the finest ways in the world to cook grasshoppers is to put a few of the succulent acrididæ into a basket lined with clay, add a live coal or two and shake gently. The dish must be served hot, otherwise much of the flavor is lost. Shrimps are nothing to it!

One of the most valuable adaptations of the new basket was to convert it into a water bottle. Covered with gum from the mesquite tree, or pitch from the pine, it made a canteen that was obviously superior to the original gourd. It could be fashioned in any size desired, and it was practically unbreakable.

A modification of the art of weaving thus learned is seen in sleeping mats and sandals, which these people now began making of plaited yucca leaves.

MAIZE

Then followed another discovery, or rather the adoption by our group of primitives of an industry that had already been acquired elsewhere. All of the Indians of the South-

west used grass seed for food. It was their only cereal, and had a great advantage over many of their other foods in that it could be kept for an indefinite period and used not only to vary the monotony of a diet largely of meat, but also as a safeguard against hunger when game might be scarce.

Now, down on the plateau of central Mexico, there grew a grass that produced a very superior sort of seed, famous throughout the country. At some remote time before this, let us imagine, in a camp of Mexican primitives sheltered by an overhanging cliff, a handful of seed was spilled in a place receiving the drip from a water jar. The seed sprouted and an observing red man noticed it. Here again was something marvelous. Seed was not only good to eat, but in some magic way, out of the very center of each seed, a spear of grass grew, instead of growing out of the ground as any properly behaved grass should.

The discoverer brought around the tribal medicine man and showed the wonder to him. This eminent personage, of course, was as much stumped by the sight as was the discoverer, but in order not to lose caste he did what many an alleged wise man has done before and since, he invented an explanation forthwith. It was an evil spirit—the Wind Wizard—in the seed that was working out.

However, our observer, Juan Newton Aborigine, was one of the original skeptics, and he did a little reasoning and investigating on his own part. The stalks of grass did not look evil nor taste evil. It was just like other grass.

A rain came and wet some more seed. That seed grew. Juan Newton put one and one together and decided that it was not the Wind God that caused the sprouting, but "Serpent," the Water God.

Again we witness a tremendous moment in history. Watts' discovery of steam did not compare with it. Agriculture, in this section of America at least, may have had its birth right there, and with it was coupled the science of irrigation. One thing that especially interests us is that the seed was a variation of the *teosinte,* the parent of maize, the modern Indian corn.

Many investigators in archæology have noticed that when primitives commenced raising crops, they often accompanied planting of seed with human sacrifice. They gave a human life to the greedy gods in exchange for the promise of a bountiful harvest. Much speculation has been indulged in as to why these two things were connected in the aboriginal mind. The commonly accepted theory is that the primitives, in countries where grain grew wild, noticed that its growth was always the most luxuriant over a newly made grave. Naturally, knowing nothing regarding the virtue of tilling the soil, it would not occur to them that it was because the ground was well cultivated that the grain grew to such perfection. Also, if grain was scattered on the grave to feed the departing spirit, naturally, that, too, affected the harvest.

It is worth recording that this tragic sort of crooked reasoning was worked out independently by primitive people in many different parts of the world. Still, while human sacrifice was connected with planting, both in Mexico and Central America, the horrid custom was never indulged in among our own Southwestern aborigines. Just how the knowledge of seed-growing was carried from the Mexican plateau northward is not material, but when it did reach the aboriginal inhabitants of the San Juan River country we see

Photograph by Gen. H. F. Robinson

Hopi planting corn in the sand dune that constitutes his field, using planting stick.

these people definitely moving on the upward road toward better things.

While our friends may now be considered real farmers, we must keep in mind that they raised their crops very casually. They did not cultivate the soil at all, simply scratched in the seed with a planting stick and returned the earth above it with the aid of a foot.

Still, even that sort of farming made a great change in tribal habits. Instead of being a free rover, the individual, for a part of the year at least, became sedentary, and while the crop was growing he must guard it against such enemies as ground squirrels, prairie dogs, deer and antelope. When it ripened, both before and after harvest, he would have to defend his crop against raids from nomads who would reap where another had sown.

This naturally caused him to extend his conception regarding one's right to property. He already keenly recognized a man's exclusive proprietorship in such personal belongings as a stone knife and a throwing stick, but these things one carried with him. Now here was a possession which must be stored, and with the necessity of defending property separated from himself he became a conservative.

He also improved his farming methods. He learned the art of seed selection, and from year to year the imported wild grass from Mexico became more and more like our modern corn.

We have referred to bins with stone sides being found in caves. These were used as storage places, not only for corn, but for such natural crops as dried cactus fruit. Similar structures were used as tombs.

Primitive minds, as we have indicated, develop slowly.

It may have taken a century or two centuries for these people to learn weaving and the fundamentals of agriculture. Then more centuries passed. One day a thoughtful member of the tribe decided that if a cave was a good place in which to store his grain, it might also be a good place in which to live, and he began to partition off his caves into dwelling rooms.

Other members of the tribe started making dwellings with masonry walls out in the open. Artificial caves they may have seemed to them, and the brush roof, covered over with clay to shed water, was certainly no less than an architectural triumph.

Our aboriginal farmer either developed squash and beans, and later, cotton, from wild plants, or such seeds reached him from Mexico and Central America. Even if he imported his seed, much of his cultural advance was due to his own efforts. It was a slow process, though, and a thousand years probably passed from the time he first began to grow corn until he reached a place where his fields contained all the other crops mentioned, and he possessed a stone house, either in the cave or out, for his habitation.

Also, during these centuries, in places where it was necessary, he developed the art of irrigation.

At first the primitives which we have been considering were perhaps limited to one group or tribe, all speaking one language. As the centuries passed, the area which they influenced steadily enlarged. Other groups and tribes, which already may have had a casual knowledge of agriculture, began adopting some of the other customs of the San Juan people. The maximum of the area influenced by the culture

may have been reached about the beginning of the Christian Era.

Throughout most of the section there was one similar characteristic; these people were sociable, gregarious folk. We seldom see evidences of one family living by itself, or if it was one family, the group was large enough to include the families of married sons and daughters. It seems to have been a sort of patriarchal life which afterward developed into what is to-day known as clan-grouping with descent marked through the mother.

The dwellings in which they now lived were the smaller group houses we have mentioned before. They might contain from five or six, to forty rooms, often built about three sides of a plaza, with a kiva sunk into it, which was often connected by an underground passage with one of the rooms which would naturally be occupied by the leader of the group —the chief or priest.

These houses might be near their fields or at some considerable distance. A little morning run to their work of a mile or so they seemed to consider in the way of a warming up process for the real duties of the day.

It should be kept in mind that while one portion of a tribe was building houses in the open, another group might be constructing habitations in the cliffs. This is emphasized here as it has been a popular conception that the two types of dwellings were made by different sorts of folk. They were built by the same people, as, with us, one city dweller will house his family in an apartment while a close relative may have a cottage near by.

About this time, we see the wives of our village farmers commencing to make pottery. Knowledge of this art may

Photograph by Gen. H. F. Robinson

A HOPI MOTHER—While she does look stolid in her photograph, besides being very kindly she is quick witted and intelligent.

have reached them from older cultures in Mexico, though it is easily within the range of possibility that they discovered it for themselves.

Each living room in their dwellings had a small fire pit, a foot or two in diameter, hollowed bowl-like in the floor. As the floors were of clay, naturally the pits would become hardened by the heat.

To protect the flatter baskets used for certain purposes, they were probably lined with clay. Once they had learned that heat hardens clay, it would only be a short logical step to fire the clay lining of the basket.

That they associated the making of pottery with basketry is seen in the fact that instead of trying to form a vessel by molding it directly from a large lump of clay as a potter does who uses the wheel, they first made a long rope of clay, and then built up the vessel basket-wise by coiling it around and around. After the vessel was done, it was smoothed on the inside and sometimes on the outside with a wooden spatula, stone or shell. All their utensils were admirable from the fact that they were perfectly designed for their use.

Each different location had its own particular marks in design, workmanship and ornamentation, so a connoisseur to-day upon seeing a bit of this ancient pottery can immediately tell the place of its manufacture.

It might not be without interest to now record a new use that the tribe found for baskets. We may imagine a young mother, who, holding her infant in her arms, is watching an oriole build its intricate nest. She remembers from previous observance how securely the nest held the birdlings even when the bough to which it was fastened rocked sharply in the strong upland wind. Why could not she, taking

pattern from the oriole, weave such a basket for her own tiny one?

What a labor-saving thing it was when the basket was made! What comfort for the busy mothers, and what a protection for the infants! No wonder all the other mothers of the tribe set at once to making them.

Carrying-baskets for the infants made one great impression

Photograph by Gen. H. F. Robinson

Eagle caged on a housetop in a pueblo. These much revered birds are held captive for their feathers and for ceremonial usages.

on the tribe that doubtless was unforeseen. To prevent their lively contents from wriggling out, the babies were tightly bound in them. The boardlike backs of the baskets were hard and unyielding; the precious babies' heads were soft, and the continuous pressing of their heads against the hard backs flattened their skulls so thoroughly that the shape of the head was changed for life.

In all these long years of advancement it seems strange that aside from the dog and the turkey, our friends succeeded in domesticating no wild animals. Turkeys were kept for their feathers rather than for food. Eagles were also penned for their feathers, but they can scarcely be counted as household pets. They had no chickens, no cats, and no beasts of burden. The buffalo with his hump and his turbulent disposition was hopeless at the work of an ox.

At an earlier time there were both horses and camels in America, but they had disappeared long before the first human immigrants had arrived. One would have thought that mountain sheep and goats might have been gentled, but while we may easily imagine that the young of both of these species were brought to the pueblos, no continued effort seems to have been made to domesticate them.

CHAPTER IV

MENACE OF THE NOMADS

ONSIDERABLY over fifteen hundred years after our people began growing corn in the San Juan district, which brings us to early in the Christian Era, the date being merely a matter of approximation, came a crisis in the history of the pueblo people, and we see the farmers with their well-built houses and cultivated fields suddenly vanish from practically all of Utah and Nevada. While there may have been other contributory causes the dominant reason for this undoubtedly was the increasing seriousness of raids by nomadic tribes.

Up to this time sporadic thievery may have been practiced by small bands, against whom it was fairly easy for the farmers to defend their crops. Now, however, with the increasing wealth of the agriculturists, the prizes to be won by pillage had become important enough to attract large forces of raiders from the savage tribes of the mountains and the buffalo plains to the east. Some of the Indian farmers in the outside districts, who had only lately taken to sedentary life, may themselves have reverted to former nomadic habits.

In the San Juan district conditions were very different. Here many centuries of steady development had instilled into these people a desire for distinctly higher standards of living, and a thought of reverting to savagery would have been as abhorrent to them as to us to-day. Indeed, these dangers,

far from destroying or even retarding their culture, acted as an incentive for still further development.

All through the San Juan district we see the people gathering into more compact groups. With the increasing number of people brought into the various units, new problems in civil government arose, and the effort which they put forth in reaching solutions afforded still further stimulation toward civilization.

With the clans whose habitations included dwellings in the cliffs, we now see not only more houses, but better ones. More kivas, too, were built. These undoubtedly contributed much to cultural advance, for while they were for the exclusive use of the men, in a certain sense they served the purposes of club, lodge room, city hall and even temple. In religious and civic ceremonies, only the more private or esoteric portions would be conducted in the kivas, the remainder of the program being held in the open plazas.

In the face of the growing danger of attack from predatory tribes, everything possible was done to increase the pueblo defenses. The ladders which must be used to reach the cliff dwelling were arranged so they could be quickly and easily removed. At points on the precipitous trail, rocks were piled which could be hurled down on the heads of attacking parties. Places of ambush further away from the cliff were made ready for use. Watch towers were built, large jars were kept filled with water, and the size of the granaries was increased.

In general, we should keep in mind that while the caves contained many living apartments, their greatest value to the tribe was as a fortress, and, as well, a storehouse for the precious corn and other foods. During normal times, the

majority of the people of the cliffs would live either in near-by communal buildings, like those by the Rito de los Frijoles, northwest of Sante Fe, or in temporary lodges. Then, when threatened with attack, a warning would be sounded on the drum by observers in the watch towers and the tribe would hasten to their aeries in the rocks.

Many of the cliffs were doubtless practically impregnable against any possible attack that an enemy could make. Their weakness was that the duration of the time a siege could be withstood would depend upon the amount of food and water that could be stored in limited space. Still, it was seldom that the restless nomads possessed patience enough to wait very long for a citadel to capitulate. The besiegers also knew that the cliff dwellers would destroy food supplies and other valuables before surrendering, so, as the nomads cared nothing for the possession of the cliff houses themselves, their capture would be a barren victory.

Also, we now see the weapons and defensive armor of the Pueblans[2] improving. Each warrior had a properly made bow with plenty of good arrows, lance points were kept sharp, stone knives and bone daggers were effectively fashioned. Each brave possessed a shield of buffalo hide, a cap and, if possible, a breastplate of the same material.

There were only a limited number of caves large enough and of proper shape to be used for cliff cities, and there

[2] Most authors writing about the Southwest use the word "Pueblo" to designate both such Indian towns as Laguna and Acoma and the people who live in them. This results in verbal awkwardness and confusion. To say that the traveler met a Pueblo as he walked toward the pueblo is rather absurd. "Pueblo" is of course a Spanish word meaning town. One doesn't call a person from Mexico, a Mexico, but a Mexican; just as a person from Arizona is known as an Arizonian. In this book such Indian towns as Laguna will be referred to as pueblos and their inhabitants designated as Pueblans.

were hundreds of families who were now leaving their old indefensible homes for safer quarters. It is axiomatic to say that if there is ability in a community, an emergency like this will bring it to the front. Among these pueblo citizens there seems to have been not only ability, but imagination as well. Let us imagine a conference of the leading men in some such community as there was now in Chaco Canyon in northwestern New Mexico. There was not room for all of the people in the cliffs, their old way of living was now impossible: what should they do? At the assembly there would be the governors from different small villages, the war chiefs, the priests and heads of clans. Perhaps this meeting was in the fall of the year when the ripened corn had been a signal for the most disastrous raid that the community had ever experienced. Not only had much of the grain been stolen, but houses had been destroyed; men and women had been killed, and girls carried off to be wives for the nomads.

The conference takes place in a level spot on the floor of the canyon in the warmth of the autumn sun. We listen as one grave leader after another rises and in well-chosen words—for the American Indian is often an eloquent orator —makes this suggestion or that.

Stronger and larger houses must be built. If possible, they must erect a structure out in the open that would be as strong and as capable of defense as any cliff dwelling.

Then a notable chief arises. He is not so old but what he retains the enthusiasm of youth, and still has years enough to have gained experience. He tells his listeners of a great community house he has been dreaming about—greater than the country has ever known; perhaps mightier than the

whole world had ever seen. Then, as his audience listens attentively, he pictures the wonderful structure that afterwards materialized in the great amphitheater pueblos that were to make the people of the Chaco Canyon famous for millenniums.

There were gasps of astonishment and doubt from the old conservatives, but there was also an answering light in the eyes of the young men.

The governors and captains talked the plan over. The medicine men consulted the spirits, gods, demigods and, most of all, their own common sense. The decision was reached. There might be minor alterations or changes in the plan, but they would build the greater community pueblo!

When the work started we need not picture any such scene as must have accompanied the construction of the pyramids by the Nile. There, slaves worked until they fell dead from exhaustion under the merciless urge of the overseer's lash. But Egypt was a monarchy, an absolutism, where the life of a commoner was a small thing to be sacrificed to give a monarch an imperishable tomb. Our pueblo citizens were members of a democracy where each man was as good as his neighbor, and the life of every one was sacred. There were leaders—chiefs and priests—to be sure, but in the pueblos we can find no quarters for them more favored by size or conveniences than others. There was no pampered aristocracy, no Pharaoh who claimed divinity.

Still, constructing great buildings even under the most favorable circumstances is no light task, especially when the workers possess no beasts of burden, and whatever labor-saving contrivances they have are of the crudest sort.

Men and women labored together. Stones for the walls and the clay to bed them may have been carried principally by the men, but the two sexes joined in putting the stones in the walls, and we know that the women did much of the plastering, as the prints of their smaller fingers are still discernible in the hardened clay.

In spite of the hard work involved we may believe they had a rather happy time of it. A careful guard was kept against the danger of an attack from enemy people; hunting parties supplied them with game, and there were doubtless stores of corn that had escaped the raiders, and wild products from the deserts that rounded their menus. If the builders labored hard during the day there was always a good dinner at night, with perhaps a cigarette of ceremony after it.

There was no seventh day of rest, but there were many holidays with various ceremonials to pleasantly punctuate the work. With a people whose only artificial light at night was that which came from the fire in the pit on the earthen floor, moonlight was well utilized. It was a time for love-making, for flute serenades, for singing and the dance. Always the dance, with the throb of the drum, the beat of the rattles, the singing of the chorus and the tread of bare or moccasined feet! The Pueblans knew how to play as well as work.

The largest and most imposing of the cities of the Chaco was the one which well deserves the name archæologists have given it—Pueblo Bonito—The City Beautiful. Originally it consisted of but a small cluster of inferior dwelling apartments. Then by invitation there came to the town a large group of a different sort of people.

Just who they were, and where they came from, is a good deal of a mystery. No people in the pueblo country, before or since, have built with such care and finish. The only place on the continent where edifices of superior construction were being built was in Mexico and Central America, yet we know these people did not come from either of these places, as there is nothing about their manner of building to indicate southern influence.

We may only suppose that they were a people who belonged somewhere in the Southwest, who were not only energetic, but had imagination and great initiative, who followed progressive leaders in determining to build a town that would not only be impregnable against any assault that might be made against it by predatory nomadics, but would be convenient and comfortable and, according to their standards, beautiful as well.

They succeeded. The town, the perimeter of whose ground plan was of a shape approximating a semicircle, covered three acres of ground. The great community dwelling which composed it formed the curving rim. On the outside its sheer wall was four stories high in which, for reasons of defense, there were no openings, except possibly on the top floor, too high for an attacking army to reach. Inside the semicircle the stories terraced downward to a central plaza, each lower roof becoming a dooryard for the apartments facing it.

The different levels were reached by ladders. Entrance to the rooms on the lowest floor was obtained by trap-doors through the roof, while the rooms on the upper stories had small openings looking toward the plaza. Some of these were rectangular, others T-shape, none over three feet high,

and all could be closed with a hide or a stone slab. Inner, unlighted rooms were used for storage.

The terraced portion of the building, as we have seen, surrounded the plaza on three points of the compass; across the fourth, on a straight line, was a string of one-story rooms. Underground in the plaza were the usual kivas.

Altogether this great apartment-house town contained over eight hundred rooms, and was capable of housing twelve hundred people.

All walls were built with a heart of the usual rough stones in clay for mortar, but when it came to facing exposed surfaces an endless amount of pains was taken in the selection of the stones and in the manner in which they were laid. Three or four courses of small stones would be put in and then, simply for the beauty of the contrasts, a layer of larger ones. Heavy pine logs were carried by man power from considerable distances to be used as construction timbers. In developing their idea of a "city beautiful" they even built a retaining wall around the city trash pile to keep things looking tidy. If unskilled workmen built a section that didn't look right, it was torn down and rebuilt.

All the while these vigorous new citizens were occupied in developing the town the original inhabitants kept on living in their old quarters, influenced but slightly by their neighbors. When a wall needed repairing the old timers would follow the new style, and they borrowed some of the newcomers' designs in decorating their pottery, but largely they kept to their former habits, probably adhering to their old religious beliefs and customs, and, as the ruins show, retaining their rectangular kivas when the new mode called for the round ones.

CHAPTER V

THE GRAND PERIOD OF THE PUEBLOS

ITH the completing of Pueblo Bonito and other community houses like it, and the extending and the strengthening of the cliff dwellings, the people we have been considering entered what the archæologists call "The Grand Period" of pueblo history.

These folks can no longer be called aborigines. In a sense they were civilized, for civilization is always a comparative thing. They were superstitious, of course. All people without the scientific knowledge necessary to understand the mysterious phenomena daily seen in the natural world are superstitious. We call Europe of the sixteenth century civilized, and yet we remember what the leaders in government wanted to do to Galileo when he dared suggest a few rudimentary facts concerning astronomy.

One indication that the early Pueblans were not wholly uncivilized is that they achieved a well-working democracy at a time when that form of government had practically failed, both in Europe and in Asia. Also, they went to great lengths to avoid war when our Nordics were taking equal pains to get into war, and their religion was a far kindlier one than were our primitive beliefs.

While, as we have seen, just preceding the Grand Period the maximum area occupied by the house-building farmers of the pre-pueblo era was pushed in from the northwest

and perhaps from the north, in other directions we see no such shrinkage. Indeed, in the upper Rio Grande and Pecos districts of New Mexico there was an expansion.

In addition to the great community houses in the Chaco Wash, sixty miles north of Pueblo Bonito near Aztec, on the Animas River, was constructed another notable pueblo on the horseshoe amphitheater plan.

In the Mesa Verde region, a few miles southwest of Mancos, Colorado, in addition to the famous Cliff Palace, the Pueblans built in a grotto in the cliffs, Spruce-Tree House, which derives its name from a tree one hundred sixty-eight years old when found in its ruins in 1891. Spruce-Tree House is also noted from the fact that it is one of the best preserved of all these ancient ruins, even the ceilings being in places in almost perfect repair.

In the same canyon as Cliff Palace, in a cave high up an impregnable cliff, was built Balcony House, with its famous gallery along the front of the upper story, commanding a view that any pueblo realtor might have claimed added at least two hundred per cent to the value of the apartments.

Also, hundreds of other little caves and holes in near-by cliffs made as neat and attractive dwellings as any young couple starting out on a modest salary might care for, and if they were a little remote from the trolley, and the drug store and movie were conspicuous by their absence, there were compensations. The vegetable garden was never more than a few miles away, just around the corner, so to speak, and two birds in the bush always equalled one in the hand, for bows and arrows were well made and the Pueblan eye was keen. Happiness is where one finds it, and our young couple doubtless had just as good a time in participating in

Photograph by Gen. H. F. Robinson

Betatakin cliff dwelling ruin in Navajo National Monument, northeastern Arizona.

colorful ceremonies, in dancing to the thud of the drum, and in playing various games of chance and skill, as do modern youths with their more sophisticated amusements.

Westward, not far across the line into Arizona, in Canyon de Chelly and the adjoining Canyon del Muerto, there was another settlement of our village citizens. Here sandstone walls rise to a height of from eight hundred to fifteen hundred feet, and the old Fifth Avenue brownstone residences, we may venture to say, contributed but few essential comforts not possessed by the de Chellians in their many snug little caves.

Northwest of Canyon de Chelly, not far from Navajo Mountain, another group of Pueblans, who had succeeded in withstanding the attacks of the nomads, built two notable cliff towns—Kietsiel and Betatakin, we now call them; the first with one hundred fifty ground-floor rooms, and the second with over one hundred.

Eastward of the Chaco country, along the Rio Grande and its tributaries, from the present New Mexico-Colorado line south into Old Mexico, and in the northern section extending still further east to the upper waters of the Pecos, a people with practically the same customs as those we have been considering, for centuries built their community houses of masonry walls, occasionally varied with adobe, and, when the formation of the country permitted, fashioned habitations in the caves. Also, they cultivated their fields, had their ceremonies and dances, their feasts, fasts and warfare, were born in pain, made love with sighs and laughter, and managed their exits gracefully or otherwise when their little dramas of life had closed, quite as did Pueblans elsewhere. The culture here seems generally to have started later than in the San

Juan country, but, with one exception, was destined to outlast them all.

Northwest of the present city of Santa Fe there is a beautiful canyon about six miles long and a quarter of a mile wide, through which runs the sparkling stream known as the "Rito de los Frijoles." Walling the canyon on one side is a fifteen hundred foot cliff of soft tufa. Immediately above the canyon floor for a distance of a mile and a half, or two miles, the pueblo artisans with their stone knives and axes cut artificial cave rooms in the cliffs, sometimes in tiers of two or even three stories. The rooms were roughly rectangular, about six by eight feet, and many of them were plastered. Some were used just as excavated, others had a wall of masonry across the front, pierced by the usual small door.

In front of many of these caves they constructed terraced buildings in the usual community-pueblo style, leaving no opening on the ground floor, but making a hatchway in the roof which one reached from the outside with a ladder.

In addition to these buildings, close to the sparkling Rito, they constructed a second large community tenement which surrounded a plaza. Besides the usual kivas sunk into the ground, some of the caves were used for ceremonial purposes.

Occasionally the inhabitants of an apartment in the cliff would decorate their walls with various drawings, pictures of mythical beasts and conventionalized figures of humans. On the face of the cliffs outside, various artists of the community etched pictographs typical of their tribe.

Puyé, in the northern section of the Pajarito Plateau, about twenty-eight miles on an air line northwest of Santa Fe, was the civic center of a well populated neighborhood. This

pueblo consisted of four large community houses set about the usual plaza, and contained well above one thousand rooms.

Cut into the cliffs which formed the sides of the mesa on which the great buildings stood were many cliff dwellings. The bedrock on which the pueblo is built is almost devoid of earth, and the many trails connecting the different buildings are cut over a foot deep by the centuries of wear from busy feet. Scattered all over the country round about were typical "small houses" of from twenty to fifty rooms.

Other important pueblos in the Pajarito country were Tshiregi, Otowi and Tsankawi. The last mentioned town has an outlook that is wonderfully spectacular. Situated on a high mesa, the three sides of the cliff below are lined with natural and artificial caves. Here, also, many pictographs adorn faces of the rock.

On the upper Pecos River was situated the important city of Cicuye, which consisted of several units of terraced houses reaching four stories in height, and boasted of five plazas and sixteen kivas. Its inhabitants numbered over two thousand and included an army of five hundred warriors celebrated for their fighting qualities.

In the southern part of New Mexico, on the upper Mimbres River and at the head waters of the Salt and Gila and their tributaries extending into Arizona, are districts that were thickly populated by pueblo tribes during, and perhaps somewhat preceding, the Grand Period of the San Juan country. Here as elsewhere the Pueblans constructed round towers, doubtless designed primarily as lookouts against enemies, but also quite likely used for various ceremonial purposes.

Photograph by McCulloch Bros.

MONTEZUMA'S CASTLE—Ruin of cliff dwelling on Beaver Creek, Arizona. It is five stories in height, containing many rooms. The bottom of the building is forty feet above the base of the cliff.

Near the head waters of the White River, a series of natural caves, varying in size, are connected by low, narrow passageways. In some of them masonry walls subdivide large apartments.

A number of interesting cave cities were built by people living in the Sierra Anchas Mountains, northeast of the present Roosevelt Lake. Sieber Castle, which obtained its modern name from the famous Apache Indian scout, Al Sieber, was built on Cherry Creek in the side of a cliff that rises twenty-five hundred feet to the top. The floor of the cave is approximately a thousand feet above the creek bed.

The only access to the dwelling was by means of ladders, and a handful of defenders at the V-shape fissure, which makes the entrance to the dwelling, could withstand an army of invaders. There are thirty rooms in this community dwelling. Passage from room to room is obtained through the typical small pueblo opening of about eighteen by twenty inches.

A few miles away, in Pueblo Canyon, two cliff dwellings were built that are even larger than Sieber, one containing forty-five, and the other sixty rooms.

Another location that was well inhabited by the Pueblans during the Grand Period was the territory along Beaver Creek, a tributary of the Upper Verde in central Arizona, where scores of caves in limestone rocks, as well as stone dwellings in the open, made comfortable homes for their inhabitants.

By far the largest of the cliff dwellings in this region was the one now absurdly called "Montezuma's Castle," for, of course, the people who lived in it were not Aztecs, and that ill-starred chief was born many generations after the castle

Photograph by Gen. H. F. Robinson

WALPI—FIRST MESA, HOPILAND.

was abandoned. This interesting structure, in its grotto a few miles above Camp Verde, is five stories in height, with the floor of the cave forty feet above the base of the cliff.

Ten miles north of the Castle is a curious basin of very deep water called Montezuma's Well. In the sides of the circular cliffs surrounding it the Pueblans utilized several niches as habitations. They also built a large stone house on the top of the cliff overlooking the basin.

Leading from the well, which is fed by perennial springs, the cliff-dwelling farmers built an irrigation ditch to their fields not far away. The water which was, and still is, strongly impregnated with lime, made a coating of natural cement on its sides and bottom which remains to-day to mark its course.

Preceding, as well as during, the Grand Period of the pre-historic pueblo culture, there lived in the deserts along the lower Salt and Gila Rivers in Arizona, a people who, while they had many of the habits and customs of the highland Indian farmers we have been considering, in some respects were significantly different.

As we have seen, the culture in such places as Pueblo Bonito and the Cliff Palace was probably autochthonous; that is, it originated and was largely developed in the location of its birth. On the lower Salt and Gila there is every evidence that a people who were comparatively highly developed culturally in the country of their origin, migrated from the south, bringing their manners and customs with them.

Altogether, they built upwards of twenty large pueblos, but instead of being of the Pueblo Bonito type, the principal building would be roughly pyramidal in design and, as

there were no building stones available, their thick walls were constructed of adobe. Lesser structures would flank the three or four-storied main building, and all would be enclosed in a high, defensive adobe wall, making a living unit which has been aptly called a compound. Surrounding this central cluster might be a number of other smaller dwellings, whose inhabitants would take refuge within the more easily defended compound in case of attack by enemies.

No underground "kivas" were built in any of the communities, but certain rooms in the main buildings would be set apart for ceremonial purposes.

The most notable thing about these desert people is the amazing extent of their farming activities and the wonderful irrigating canals they built. A quarter of an acre might be a large farm for a highland farmer, and twenty or forty acres or so of cultivated land might be all that would be available for an entire community. The desert farmers of the lower Salt River alone built irrigating canals aggregating two hundred and forty miles in length, and capable of irrigating ninety-six thousand acres of land. From twenty to thirty thousand acres more might have been farmed from the water of the Gila.

The largest of these canals, at their heads, measured from fifty to seventy-five feet across the top and twenty-five to fifty feet on the bottom. In more than one place the level of solid bedrock had to be lowered to get the requisite grade.

Their only excavating tools were digging-sticks and stone hand-hoes. The sticks, which were doubtless of many shapes and sizes, may have been fashioned from ironwood. The hoes were thin slabs of shale or slate. They were anywhere

from eight inches to a foot or more in length, and five or more inches in width, with one edge ground down knife sharp. Nearly always they were used without handle, though I have seen two that still showed holes where they were fastened to some kind of a stick. After the earth was loosened by digging-sticks and hoes, it was carried away in baskets. Grades were lowered in bedrock by first heating it with a fire and then pouring water on the rock, which would crack it. Think of the work and time it took!

Only two of the many ruins which dot this region have received careful scientific investigation from archæologists, Pueblo de los Muertos, in the Salt River Valley, and the Casa Grande, which lies about two miles from the Gila River, on the line of the Southern Pacific near Coolidge, Arizona. The latter was the last pueblo on the lower river to be abandoned, and while it was doubtless deserted for centuries before the Spaniards came, when the Jesuit missionary, Father Kino, saw it in 1694, although the roof was gone, the walls were still in excellent repair.

Indeed, protected from the elements by a temporary corrugated iron covering placed there by its modern custodians, it is in a remarkable state of preservation, the walls on the inside retaining the ancient plaster, with handprints of the original artisans still visible.

Careful excavation has uncovered walls of flanking buildings within the compound. In addition to this, in other compounds near by can be outlined the buildings of a still earlier period, and buried beneath the level of this group can be seen the building levels of two eras that stretch still further back into the past.

In opening up these rooms a wonderful collection of both utilitarian and æsthetic artifacts have been obtained. The stone axes, made of dolerite, admirably proportioned and sharpened to a keen cutting edge, are by far the best that were made in the Southwest, and were capable of doing real execution on mesquite trees, as well as on the softer cedar wood. Which reminds one that cedar trunks floated down the river from distant mountains were used for ceiling joists. They were real craftsmen—these builders—willing to exert an amazing amount of effort and capable of exercising infinite pains to get their dwellings just right!

There have also been found within the ruins not only articles typical of the vicinity but, as well, many things from other sections. These include pottery from the Little Colorado River country, and beautiful mosaic work in shell and turquoise inlaid on wood and gum that might either have been brought from the Pueblo Bonito, or more likely were copied from similar articles of art from that city. The most notable of these inlays shows what seems to have been intended for an owl or parrot with outstretched wings, in shell, surrounded by a field of tiny blue stones, with a head carved in wood.

El Pueblo de los Muertos, which was unearthed by Frank Hamilton Cushing in 1887, was situated about five miles west of the modern town of Chandler. Here were found the ruins of a veritable city, to which he gave the Spanish equivalent of "The City of the Dead." This was doubtless one of the largest and most important cities of its time in the entire Southwest. There was not only a large pyramidal cluster of apartments in the center surrounded by a defen-

sive wall, but beyond there were more sparsely settled suburbs extending for the distance of two miles.

This city was doubtless founded at a far earlier date than the Casa Grande, and quite likely may have been abandoned before the present remaining structure at Casa Grande had been built.

At the height of its prosperity "Los Muertos" must have been anything but a "dead" town, with its imposing buildings and picturesque courts teeming with life—men going and returning from their fields, or perhaps sitting in groups talking politics as they busied themselves sharpening arrow points or putting a better edge on their stone axes; women placing hot stones in the roasting pits ready to receive agáve hearts brought in from the Superstition Mountains, or weaving baskets or decorating pottery, and always there would be plenty of naked children playing in the sun.

Nothing whatever is left of the pueblo now. Even the ground where it stood has been leveled into a very modern alfalfa field where cattle ruminate placidly, apparently unhaunted by any ghost from that all but forgotten past.

There was also a colony of people whose habits greatly resembled those of the lower Gila district, who lived during the Grand Period in what is now the state of Chihuahua, Mexico, in a long, wide valley bounded on the west by the Sierra Nevadas. Here they built large community houses in the open, and in the foothills to the southwest had their dwellings in the cliff. These dwellings were of adobe, and resembled those of the Gila Valley, except that their walls were much less massive, and lacked the surrounding defensive barricade.

Also, as is the case in the lower Gila, there remains to-day

but one group of ruins that even approaches a fair state of preservation. This group is called the Casas Grandes, which is located near the Casas Grandes River, a tributary of the Ascension.

Along the Little Colorado River there lived a division of our sedentary Indians who, during the Grand Period, seemed to have acquired manners and customs and, quite likely,

Photograph by Gen. H. F. Robinson

A VILLA IN WALPI, HOPILAND.

colonists as well, both from the San Juan and the Rio Grande districts on the north and northeast and the lower Gila on the south.

The earliest form of dwellings here of which we have any knowledge, was the usual pueblo stone house, apparently rather poorly constructed. Later, dwelling clusters of pyramidal design were built.

The "Seven Cities of Cibola," about which such marvelous tales were told in Old Mexico, and which were the inspiring

motive for the Coronado Expedition in 1540, were a group of rather inferior pueblo structures in the vicinity of the modern town of Zuñi.

Pueblos in Hopiland also doubtless were founded in very early times, and they have existed in different places in this vicinity for two thousand years, or more. Here, too, were first built small, detached houses, which were followed by pyramidal structures resembling in a general way the present-day town of Walpi.

The farmers here seem to have been largely forced to depend upon rainfall, rather than irrigation, in raising their crops.

CHAPTER VI

NUMBER OF INHABITANTS

S WE contemplate the great area inhabited by the pueblo people during the Grand Period, their admirable adaptability in making homes in vastly different environments, in one place surrounded by cactus-covered desert, in another among the oaks and mesquites of foothills, and, in still another, under the pines of rugged mountains, utilizing building stone where it could be obtained easily, doing equally well with adobe where no stones were available, walling natural caves off into apartments, making artificial caves when the rocks were not too hard—and doing all these things with tools of stone; also, when we think of the amazing magnitude of some of their building operations, all sorts of questions concerning them come into our minds.

What was the maximum number of inhabitants? How many tribes were included in the culture? How many different languages did they speak? What kind of clothes did they wear? Were the different colonies friendly toward one another? What sort of religions did they have; what kind of governments? And finally, the greatest mystery of all—what became of all these people?

An estimate of the grand total of the numbers of these various tribes is something that even the best informed of the Southwestern archæologists handle with a great deal of circumspection. The aggregate acreage of the tillable

land under the ancient canals in the lower Salt and Gila valleys, if all of it had been farmed at the same time, would have been capable of supporting a population of from one to two hundred thousand people.

When we keep in mind that the dwellings in the cliffs were used more as places of refuge and for the storing of crops and other valuables, than as places of habitation, and that they were supplemented by temporary structures that have left no ruins, we can see that the upper Gila district, combined with the territory along the Mimbres River, might have had room for five thousand people more. The Rio Grande country could easily have supported and housed another thirty or forty thousand. Five thousand could have lived in the San Juan district, and ten thousand in the community buildings large and small in and about the Chaco Wash. To add to this, we have the inhabitants of the Chihuahua region, and of the many pueblos which were built in the Little Colorado country.

It was this sort of estimating that convinced early students of these people that during the peak of the Grand Period around three hundred thousand souls must have been living in the Southwest. This, however, was upon the assumption that all of the tillable land was being farmed at the same time, and that all the thousands of community houses scattered over the country were simultaneously tenanted.

Later investigation has proved that nothing could be further from the facts. In the deserts of the lower Gila and Salt possibly not more than two or three or four canals were in operation at the same time. A canal would be built, used for many years, when a change in the course of the river or the dropping of the river grade might have made it impos-

sible to get water into the canal head. Or it might have been that a change in the water level of the soil caused alkali to rise in the fields in a certain district to such an extent that farming ceased to be practicable. One or all of these reasons would have caused a canal to be abandoned and a new one constructed. Indeed, it is wholly likely that the final migration of the Pueblans from the valleys of the Salt and Gila to upland locations was largely induced by the fact that as time went on the lowering and changing beds of the rivers made it impossible for them, with their limited knowledge of engineering, to get water from the rivers into any of their principal canals, and they could see no good sites for new ones.

When we come to consider those of our people who lived in the highlands, we must not forget that even when Indian pueblos were composed of houses with well-built masonry walls they were not looked upon by their inhabitants with the same sense of permanency with which we, to-day, would consider a city. Some of the ancient pueblos such as Casa Grande on the Gila doubtless housed a continuous population for several centuries. Others, though, may have been abandoned in whole or in part after a comparatively short existence.

While the major reason for such an abandonment may have been adequate enough, many of the lesser ones would have seemed far from imperative to a modern community. For example, the leaders of a dominating clan in town government might be unfair in the distribution of farming lands or building sites. This might bring on civil strife, when the smaller group might either leave or be expelled. A continued drought or the failure of a spring might be

interpreted by the medicine men to mean that the gods had cursed a location, which would leave no alternative but to seek a new townsite. The most frequent cause of migration was warfare. Continued raids from nomadic tribes, or even civil strife with another peublo tribe, might easily make a city untenable.

It was probably very seldom that an attack directed against one of the larger pueblos would result in the annihilation of its inhabitants. The natural defenses were too great. It was through their fields that the Pueblans could most easily be injured. One raid after another would occur—one crop after another would be destroyed—until living conditions became impossible.

We must keep in mind, too, that the building of a city in a new location presented no such complications as it does with us. No accumulated family savings would be dissipated in the process. There would be no superintendent of construction to employ, no building material to purchase, no mechanics to hire. As we have seen, every family had its own building superintendent, artisans and common laborers, and the country, without toll, provided clay and stones for the walls, and tree trunks, boughs, leaves and clay for the roof.

Having no beasts of burden, when they moved they took with them what they could conveniently carry on their backs, and the rest they left behind.

It is altogether likely that, instead of some two or three hundred thousand Pueblans living in the Southwest at one time, less than a quarter of that number would be nearer the right figure.

We would like to reserve to the end of the chapter a

consideration of the question as to what finally became of these people, using it as a climax to our dramatic story. However, as the consideration of this question will help to explain many other problems, it is well to try to find its solution now.

Earthquakes, deadly fumes from volcanoes and wholesale massacres have all been popular suggestions as causes for their disappearance. These may be easily dismissed. There are no fissures in the walls of the ruins to suggest seismic disturbances, and there were no volcanoes in the country during its habitation by Pueblans that could have played Vesuvius to their Pompeii and Herculaneum. Instead, from causes already considered, group by group, they abandoned cities that lay at the periphery of their great area, especially in the southwest portion, and consolidated for the most part along the Rio Grande, with such outposts as Zuñi and the Hopi villages.

The people never were exterminated. Reduced sadly in numbers by continuous warfare they undoubtedly were, but in the inhabitants of such cities as Walpi, Acoma, Cochiti and Zuñi we see the descendants of the ancient people.

Not that we mean to say that the modern Pueblans contain all the blood that remains to-day of the pre-historic village folk. Many of the women were undoubtedly carried into captivity by nomadic tribes, and married. Then, too, small groups of Pueblans, less fixed in sedentary habits than were others of the tribes, exasperated by long years of trying to raise crops in the face of repeated raids, may themselves have given up sedentary life and become free rovers.

The blood of the modern Pueblans also became somewhat mixed. We need not think of them as always being defeated

in their warfare. They may have won as many battles as they lost, and they, in turn, captured nomad women who became mothers of subsequent Pueblans.

Nevertheless, the modern Pueblans are the direct heirs, both of the flesh and the culture of the ancient. This is shown not only in the similarity of their building, their pottery and other artifacts, but by studying the ruins of their kivas and other ancient ceremonial chambers, and bits of sacerdotal paraphernalia found, and comparing them with what we know of the modern tribes; the connection between the two is undeniable; they are one and the same people.

The modern Pueblans themselves recognize this to be true, and various clans among them claim this or that ancient city as the home of their ancestors. While these are but traditions, and Indian traditions are not to be taken too seriously in all details, many of them often contain more than a modicum of truth.

One story has it that emigrants both from the Casa Grande on the Gila and cliff dwellings in the Mesa Verde found new homes in Hopiland in northern Arizona. One clan from the ancient city of Awatobi, in the Hopi country, went to live in San Ildefonso, and people from ancient Puyé are supposed to be the ancestors of certain clans in Santa Clara, New Mexico.

The original founders of the buildings by the Rito de los Frijoles are credited with making five migrations, each time building a new city, until they finally constructed the pueblo of Cochiti, which they still occupy.

When one considers the large number of inhabitants in certain districts, the rugged and infertile land occupied, the small rainfall and the scarcity of springs, he is inclined to

wonder just how it was possible for our Pueblans to tease crops from the soil in a sufficient quantity to retain unity between soul and body.

This, naturally, was easily enough accomplished in the lower Gila country, but in such regions as the Chaco Canyon, for example, the conditions were different. Here eleven large community cities were built in a country that was not only desert-like in its characteristics, but where there was no permanent stream and but few springs to provide water. Yet, nowhere in all the pueblo area did the people rise to higher cultural levels.

In studying the matter, we must remember, as Doctor Kidder suggests in his introduction to his study of Southwestern archæology, that it did not take a very large field to supply a Pueblan with his cereal and vegetables.

In the first place, a farmer had only to provide for his immediate family, and every family in the pueblo had its little farm. There were no non-producers to be fed; no insurance men or book agents, no realtors or stock brokers, no bond salesmen or bank tellers. Even the medicine man, though he might receive gratuities for his services, doubtless had his personal little garden patch to rely upon when professional business was slack. And, although we may find ruins of dwellings where there is no land that could possibly be tilled within several miles, we must keep in mind, what we have already noted, that a Pueblan seemed to think that if his garden were within a radius of five miles or so from his house it was wholly convenient.

It has often been suggested that the Southwest, during the time it was occupied by the Pueblans, might have received a much greater rainfall than it does at present. Back

in the glacial period, climatic conditions undoubtedly were quite different. Then there was rainfall enough to heavily carpet the entire region with abundant herbage. These conditions ended with that period, and it is highly unlikely that one, or even two thousand years ago, desert conditions were greatly dissimilar to what they are now.

There was, however, one marked difference. In many places in the Southwest above an altitude of three or four thousand feet, where the surface of the earth is now bare, a century ago it was well covered with grass. When cattle, sheep and goats were introduced into the country and turned upon a range in greater numbers than it could support, the turf covering was destroyed, and thereafter when rains came, the water, instead of soaking slowly and evenly into the land, plowed deep furrows and ran down in torrents to the bottoms of the gulches. This procedure has not only washed away much land that was formerly capable of cultivation, but it has also lowered the water-table to such an extent that, coupled with a naturally scanty rainfall, the remaining land is almost incapable of producing a crop.

The Pueblans were foresighted and provident. A dry season was an ever-present possibility; indeed, two arid seasons might follow each other. Also, there was the danger that a crop might be destroyed by enemies. So it was a first precept in their economy to keep one's granary full. Castañada, the historian of the Colorado Expedition, reports that in every village the soldiers would usually find corn enough to last for two or three years.

For meat the Pueblans ate such birds as quail and doves, and the usual game animals, such as rabbits, antelope and deer. Even ground squirrels and desert rats might not have

been scorned, prairie dogs may have been regarded a delicacy, as they are to the Navajos to-day, and certain insects considered quite toothsome.

Besides the corn, beans and squash which they raised in their gardens, they found growing wild in the country about them a variety of things to round out their menus. The more common of these natural products included acorns, mesquite and screw beans, piñon nuts, walnuts, grapes, various kinds of berries and cactus fruit, grass seed, agáve centers and roots like the wild parsnip. Even leaves and buds, properly prepared, found a place in their dietary.

Indeed, it is easy to see that when not too seriously molested by predatory tribes, and in spite of taboos which might prohibit certain articles for food, there was usually plenty to eat, regardless of the lack of groceries, butcher shops and bakeries.

They had a calendar. They marked the coming and going of the seasons, the time for planting their different crops, and the time for their annual ceremonies.

CHAPTER VII

ARTIFACTS

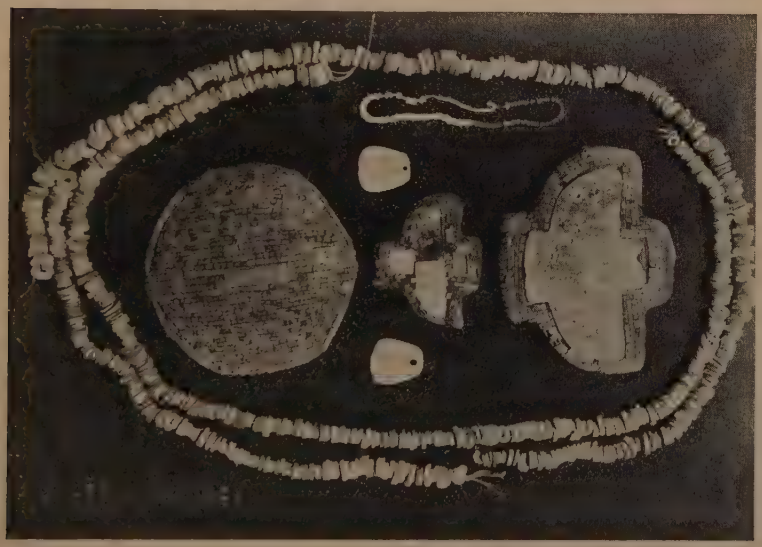
N considering the various artifacts made by these people our admiration is excited not only by the admirable utility of their products, but in many cases by their artistic qualities as well. Naturally, different groups worked with differing degrees of excellence, and in the same groups talents varied with individual artisans.

While most of the people doubtless had seen such metals as copper, gold and silver, they had no personal knowledge of how to melt, or otherwise work them. Indeed, though the Mayans and other southern tribes made ornaments from the metals mentioned, which in the course of trade were, on rare occasions, acquired by the Pueblans, no metal tools seem ever to have been made by any natives in America prior to the time of the Spaniards.

Nevertheless, the Pueblans attained wonderful results with the materials with which they were familiar. The best of their stone axes, and their arrow and spear points were admirably fashioned; their bone daggers and awls were effective instruments; even their stone hoes, while crudely shaped, did their work fairly efficiently.

The more common of their ornaments included beads of fired clay, bone, wood or shell, turquoise or other stone. Pendants were fashioned from stone or shell, some in the forms of animals, birds, human faces or figures. These were

crude enough, naturally, but often delightful in their naïve quaintness. Bracelets and rings were made from bivalve shells, with the centers ground out until the article would fit the finger or wrist. Bells made by grinding off the lower end of thick spiral shells, and piercing a hole through the upper end, so that they might be fastened to bracelets,



Photograph by courtesy Geo. L. Boundey

PREHISTORIC JEWELRY OF THE ANCIENT PUEBLANS—Necklaces, mosaics and pendants found buried under ruins at Casa Grande Ruins.

anklets, or clothing, were common. Copper bells, as we have before indicated, were occasionally acquired from the south.

CERAMICS

In none of their arts did the pueblo women express themselves more characteristically than in their ceramics. Each

district had its own peculiarities in design, workmanship and decoration, and naturally there was a wide variation in the talents of the individual potters in each group.

Dark colored, nearly black, cooking vessels were made practically throughout the entire pueblo area. All were smoothed on the inside. On the outside a corrugated effect might be obtained by leaving unsmoothed the curves of the ropes of clay as they were coiled into the piece, and further ornamentations obtained by indentations made by the thumb.

The dark color could have resulted from the potter making a smudge of her fire after the dish was partially burned, or it might be a natural result obtained by continuous use about a family hearth afterwards.

Vessels not used in cookery were usually ornamented by first covering them with a wash or slip either of white or in tint, and then applying designs in different colors with a fibre brush or stick. The earliest combinations most commonly used were black decorations on a background of white, or white with a grayish or pinkish cast, or red on buff.

In the Mesa Verde district corrugated, black on white, and occasionally red, vessels were made. The prevailing shapes included ollas (water jars) bowls, ladles, pitchers, "kiva jars" with covers, canteens and mugs suggesting a German beer stein.

In the Chaco Canyon the ornamentations were usually confined to corrugations or black figures drawn on white. The shapes of the ware did not differ greatly from those found in the Mesa Verde country, except the Chaco Canyon women made a tall, cylindrical vessel and fashioned their mugs with rounded bottoms. The Chaco neighborhood

was dryer than the Mesa, and perhaps etiquette forbade setting down an empty stein.

Mimbres pottery was marked with corrugations or with black on white decorations, the applied designs being noted for their quaint and spirited figures of animals, birds, fishes and people.

In the upper Gila country a characteristic ware was a

Photograph by Gen. H. F. Robinson

MODERN HOPI POTTERY.

pitcher with a bulging lower part and a cylindrical neck, with the handle moulded in the form of a slim animal like a ground squirrel, reaching from the neck to the flaring lower part.

The ambitions of the potters on the lower Gila seemed to be more in the way of making large ollas than in fanciful ornamentations. The summers here were far hotter and dryer than even in the Chaco Wash, and the people evidently

wanted a water jar that would not require continuous replenishing. One found in the Casa Grande ruin would hold thirty-nine gallons. Here the coloring on the ware in the various sizes included plain red, simple figures in red, white and black, black drawings on white, and red on buff.

The earliest pottery made in the Rio Grande district was the usual black on white, a little black on red, and a poorly made corrugated. At a later period, evidently after the abandonment of such western towns as Pueblo Bonito and the Cliff Palace, the women along the Rio Grande learned how to use glazed paints. These were first applied on red, and later, on thick gray vessels now known as biscuit ware.

Glazed paints were used in various colors with beautiful effects until a date as late as one and one-half centuries after Coronado's *entrada,* though with the Sixteenth Century the work deteriorated.

In the Little Colorado region, where the cultures both from the north and the south seem to have met and mingled, a great variety of colors was used in the decoration of vessels. First came the usual corrugated, then red or black on gray. For a time the potters used a red as a background for bold designs in black lined with white. Late in the prehistoric period, artistic designs in black were painted on a buff ground, which included some very fine examples of the ancient art. In certain pueblos, partial cremation was practiced when large jars were used for the inhumation of partially incinerated bones.

At Awatobi and Skyatki and other places in Hopiland, at some time during the Grand Period, the women potters produced a ware that was perhaps the finest ever made in the pueblos. On these pieces the wash or slip was applied in

various shades of cream, yellow and orange, with artistic designs in brownish black and red, in nearly all cases most admirably executed.

BARTER

While the Pueblans suffered much at the hands of the nomads, we need not infer that there was always warfare between them. Except for certain turbulent bands, the rovers may not always have been lawless, though these peaceable impulses on the part of the predatory tribes would doubtless be accentuated at times when the Pueblan walls were in especially good repair.

During these periods of truce, barter between the nomads and the villagers would take the place of forcible seizure, when the former would bring to the pueblo gates dressed and undressed skins of deer, elk and buffalo and even fresh meat, to exchange for ornaments, cotton garments, corn and squash.

One wonders just what they thought of each other! To the city folk, the mountaineers and plainsmen were doubtless "rough necks," while "dudes" or "rabbits," or some other opprobrious designation would probably express the opinion entertained by the roving warriors of the house-dwellers.

There was doubtless more or less trading continuously going on between different pueblos, especially between villages speaking the same language. With the abundance of fertile land, and water for irrigation, at their command one can easily imagine the farmers of the lower Gila district having a surplusage of corn which they would trade with the mountaineers of the upper Gila for yucca fibre and other things.

TRAILS

A scenic automobile highway between Phoenix and Globe has gained international fame as the Apache Trail, deriving its name from the fact that in a general way it follows a trail used for many generations by the Apache Indians. However, centuries before that warlike tribe ever was formed this pathway was used by the Pueblans in intercourse between the cities of the lower Salt and Gila and the cliff dwelling community houses still further eastward on the upper waters of both the Salt and Gila.

When Fra Marcos, the first white man to penetrate our Southwest, journeyed northward from the ancient city of Culiacan, in Sinaloa, his Indian guides conducted him along the San Pedro Valley to the Gila, then over the mountains to the northeast until they came in sight of the Zuñi pueblos, all the time keeping to excellent trails.

The New Mexican pueblos were also connected by well laid out pathways. There was no need to make them wider than was necessary for humans to travel comfortably in single file, but they followed easy grades and took fairly direct lines from place to place.

It needs but small imagination to picture these trails as the stage for many graphic scenes. Besides the peaceable trading parties, surveying parties searching for sites for new towns would travel them. They would be used by runners carrying civic messages from one city governor to another—invitations to come to a ceremonial, word of a new alliance between certain villages, news that the nomads were on the warpath—many things. Then, too, war parties themselves,

both Pueblans and nomad, with the braves stripped to loin cloth and moccasins, though the villagers might also wear rawhide caps, their faces streaked with war paint, carrying clubs and rawhide shields or bows and arrows, would hurry along, their eyes full of the light of battle. A very different sort of a scene would be that made by fugitives fleeing away from despoiled fields and destroyed homes, carrying a few of their most prized possessions, and traveling by the light of a fitful moon.

FASHIONS FROM 500 TO 1500 A. D.

Fashions with our Pueblans did not inevitably change with the spring and fall equinoxes. Possibly occasional sartorial innovations at such fashion centers as Pueblo Bonito or Puyé might have caused slight flurries among the beaux and belles of the provinces, but when one not only fashions his own clothes, but weaves the fabric, or dresses the skins from which they are made, and possibly even shops for the hide "on the hoof" with bows and arrows, or raises the cotton from which the yarn is spun, the work involved is too much like the details regarding the house that Jack built to permit any very frequent changes in endeavoring to rival Solomon in his traditional glory. What variations there were, were largely necessitated by climatic or environmental differences.

Generalizing, it may be said that the men wore a loin cloth of cotton or yucca fibre, and upon ceremonial occasions or in colder weather they might have added a short kilt stopping a little above the knees, and a sort of cotton jacket or shirt made of two square cotton cloths sewed to-

gether, to which short sleeves might have been attached. Sandals of plaited yucca leaves fastened with yucca fibre strings protected the feet.

The women probably wore a short-skirted, sleeveless dress of woven cotton or yucca fibre with the left shoulder exposed.

Photograph by Gen. H. F. Robinson

HOPI KATCHINAS—Images of demigods. Used by Hopi children as playthings.

They, too, at times wore yucca sandals. Both men and women, when etiquette or the weather demanded, might have added a finishing touch to their apparel by draping toga-wise from their shoulders a blanket usually made of woven rabbit skins, though in certain sections the blanket might have been made of turkey or other feathers fashioned on a yucca

fibre foundation. Much of the weaving was beautifully done, with ornamental variations in the arrangement of threads. The Pueblans were adepts in handling dyes and could color their fabrics in various hues.

In contrast to this general costume, the dress of the inhabitants of the towns on the northeastern edge of the pueblo area was for the most part made of dressed deer and buffalo skins. This difference was due to the fact that, owing to its nearness to the buffalo country, skins could be obtained more easily than cloth.

CHAPTER VIII

GOVERNMENT

HE government of the prehistoric Pueblo Indians, judging from what it was at the time of the Spanish Conquest, was not only a practical but an exceedingly efficient democracy, where the rights of the individual were usually scrupulously guarded.

There were no specially privileged classes, no aristocracy at one end of a social scale, nor proletariat at the other. Captives taken in war might for a time be held in involuntary servitude, but we are safe in assuming that in most cases citizenship was possible if the captive proved worthy and adaptable.

While the spheres of the sexes, both in their political and domestic relations, were sharply defined, we can discover nothing to indicate that the woman took an inferior rank. As we have seen, with but slight assistance from the men, she built the family dwelling and was, as well, mistress of it. In cases of separation, it was the man who moved; the women and the children, if there were any, stayed.

Kivas were for the exclusive use of the men, and let us trust that the women's stone-mason union made the men build them without feminine assistance. The officials of a pueblo were usually men, but descent, and therefore clan membership, was counted through the women.

As is the case with most primitive people, the Pueblans'

Photograph from Putman Studios

Hopi cacique in underground kiva singing to the beat of the tombé as did his cliff-dwelling ancestors.

civic and religious affairs were closely allied. Each town had a council not unlike our own village body of lawmakers. In some communities the councillors were elected annually —in others they occupied their places indefinitely.

The most important officer was the cacique, whose duties were both civic and religious. He was usually selected by his predecessor, and was carefully trained for the position, which he held for life.

In a priestly way he was supposed to be able to communicate directly with tribal deities and convey their commands to the people. This naturally greatly added to his prestige, and gave weight to his manifestoes. Think of the significance of a ruling of a present day prohibition officer if he could emphasize it with a few comments direct from the gods—from Bacchus, for example!

The cacique held himself above the small politics of the town, and left to the council the deciding of ordinary routine matters. He usually nominated most of the other officials, his actions being subject to confirmation by the council.

In the Rio Grande pueblos, the inhabitants divided themselves into two bodies, one including clans whose ceremonies occurred in summer; the other, those whose rites were observed in the winter. Each body had its own cacique. If the two caciques worked together harmoniously the village political machine would run smoothly; if they didn't, then there would be intrigue and contention.

In Taos the office of cacique was inherited, going to the eldest brother and from the last brother in one generation to the oldest of the next.

The war chief, as his title indicates, had charge of the town's defenses and was the leader in all military operations.

He was, also, the town's sheriff, master of community hunts and superintendent of such group work as the building of irrigating ditches and dams.

Each town had, as well, its civic governor or mayor, who represented the pueblo in its dealings with other villages. He was the executive of the council.

In making up our list of officials we must not forget the town crier. The announcements of this important personage took the place of the daily newspaper, being delivered from a central house-top each morning.

All officials, apparently, were subject to recall in case they proved incompetent.

Medicine men, who not only treated disease, but also might foretell changes in the weather, practice augury as to the success or failure of a battle, or dispense amulets or fetishes, received for their services compensation in food and other things. Naturally these influential personages acquired their position through personal qualifications. While the emoluments of the position were great, there was also peril in the job, for if failure in their magic became a habit, or their predictions too often failed to come to pass, they might not only lose their reputations, but their lives as well.

Although the Pueblans seem to have gotten along without prisons as we know them, we need not suspect that the town executives did not often find it necessary to back up their laws by disciplinary measures. Temporary detention of delinquents was probably secured by use of stocks or guard rooms. Flogging was a common punishment for certain transgressions against either the civic or ecclesiastic codes.

There seems to have been no crime that the Pueblans

treated with greater severity than witchcraft, except, probably, treason. Death was the usual penalty in either case.

Although aggravated cases of murder might also receive the extreme penalty, in certain cases of manslaughter the homicide might simply be required to assume the duties of the slain, or make property propitiation.

In historic times the slayer has been required to marry the widow of the slayee. Let us trust that her consent was first required.

Boys, we have reason to believe, were instructed in civic duties and in tribal lore by the old men of the pueblos in a sort of kiva school. Part of their initiation into citizenship at the time of the Spanish conquest included a Spartan flogging to prove their manhood. This was inflicted in a solemn ceremonial where the one who administered the punishment was disguised in the habiliments of a god. After it was over the chastiser would unmask to show the youth that men were called upon in ceremonies to impersonate and carry out the wishes of "Those Above."

It must not be inferred from this that tribal discipline of children was cruel. On the contrary, among practically all of the Indians of the Southwest, elders are uniformly kind and considerate to the children of a community.

As we study the rise of primitive people in Europe and Asia we see patriarchal rule usually followed by tribal, military or priestly government, and if a restricted democracy came into force it would before long likely be replaced by a despotism. In contrast to this, during the fifteen hundred or two thousand years the culture of the pueblo Indians continued in the Southwest, they seem to have continuously maintained their simple democratic rule.

Naturally, we need not assume that their government was always wise, or that justice was always impartially rendered. We may easily imagine this clan or that becoming strong enough for their leaders to dominate a town, when they would put in officials who would favor their own particular clan. Even in our times, as far along toward civilization as we like to feel that we are, in such admirably governed pueblos at Neuvo York or Saintly Francisco, aldermen have been suspected of favoritism.

The Pueblans seemed to combine individualism with a united interest for the common good rather happily. The citizen had for his own the fruits of his personal labor. He had no deed to land or a chance for real estate speculation, but had allotted for his personal use as much of his proportion of the tribal fields as he could usefully till. Also, his family, through his wife, had personal rights to their quarters in the public apartment house.

It is easy to wonder why, when, after doing so admirably in civic administration and social customs, and practicing the same things over and over, century after century, they couldn't have gone a bit further and have done a bit better. Though when one comes to study the matter the surprising thing is that they did so well.

When our Nordic ancestors started to emerge from savagery they immediately became the legatees of all the advanced cultures that had preceded them—that of the Sumarians, the Chaldeans, Hebrews, Greeks and Romans. They had for the asking, knowledge that had taken earlier peoples millenniums to acquire, and included in it was the knowledge of that inestimably valuable thing, the art of working iron and steel.

The pueblo folk had no previous higher cultures in America from which to borrow. The Mayans had a finer technique in their art, built superior buildings and had mastered a better form of writing, yet in most things they were but little further advanced than the Pueblans. Their form of government was probably less admirable, and their religion more cruel.

In concluding our section regarding pueblo-dwelling farmers, we are painfully conscious of its fragmentary nature. This is the story as it is known to-day; to-morrow we trust we shall know more.

In the meantime, our greatest desire is to awaken our readers to the fact that in the study of these remarkable Americans we have been following one of the greatest stories in the world, how a people, practically unaided by any outside influence, developed from savagery to comparative civilization. We would also have the reader keep in mind that the rise of the Pueblans is not only worth one's consideration as a colorful tale, but that their history, when finally worked out, may have its greatest significance as a contribution to the science of social evolution.

The two traditional schools of writers have had their fling at the tale, the romanticist painting with a Kiplingesque comet-tail for a brush and a rainbow for a palette, and the so-called realist, drearily working away on the job with the drabbest crayons he can find.

We have already indicated what the romanticists imagined about these people. The realists, on the other hand, still insist that they were just buck and squaw Indians who made big wickiups instead of little ones.

In our own case, in trying to keep to that perilous position

familiarly known as "the middle of the road," we trust we have neither alienated ourselves from truth nor from our readers' interest.

The greatest drawback to a more rapid advancement of the Pueblans was their superstition, that same old ogre that has held back all of us humans ever since we first began to climb upward.

Still, it seems to be an inevitable condition. Thinking further upon the matter, perhaps instead of being a hobble, superstition is one of the steps upon which we all must mount. Without imagination there can be no conception of better things and, as it is bound to be in a primitive race, imagination undirected by knowledge cannot help but become mixed with superstition.

We, ourselves, are not yet rid of it. So let us not be surprised to learn that, with the Pueblans, innovations that would have helped develop them more rapidly were naturally frowned upon as a presumption in the face of precedence and decency, and that real scientific thought was regarded as impious—just as it was in Europe in the Middle Ages, just as it is everywhere to-day where people retain the small-town outlook upon life.

The great strength of the pueblo people was their tenacity in holding each cultural step forward as they gained it, and also that if they did advance haltingly, with brakes dragging on all four wheels, go forward they did—persistently.

The more we study them the more we half believe that, after their long years of preparation, they were on the very eve of much greater things when the arrival of the Spaniards changed their autochthonous advance to one more or less associated with outside ideas.

In sociology, as well as civics, they were working upon such different lines from our own, one wonders just what they might have achieved had they been left to themselves. If Columbus had come over a few centuries later the world might have learned some very interesting things from them. Perhaps it can, as it is.

SPANISH CONQUEST AND COLONIZATION

CHAPTER IX

CONQUEST AND COLONIZATION

THE immediate incentive for the exploration and conquest of the Southwest, as is well known, was supplied by a fantastic story current in Mexico City in the sixteenth century, concerning the vast wealth of the legendary Seven Cities of Cibola which were supposed to be located in the unknown areas to the northwest.

In order to ascertain just what there was to these remarkable tales of Indian cities where gold was so common that it was used for dishes and where the portals of the houses were encrusted with turquoise, the Viceroy Mendoza, in 1539, sent Fray Marcos de Niza to spy out the land.

All alone went this intrepid Franciscan save for a Barbary negro slave, Estevanico. Early in his journey, while in what is now Sonora, Fray Marcos sent the negro ahead on a reconnaissance. So impressed was Estevanico with his own importance that he did not return or await his master, but guided by friendly natives who deemed him a magician, he continued on ahead, acting as a self-appointed royal ambassador. However, when he had gone as far as the Zuñi village of Hawikuh, disaster overtook him, for there the inhabitants killed him for his arrogance.

In spite of the fact that friendly Indians brought to Fray Marcos tidings of his servant's tragic end and that he had reason enough to believe that the Zuñis might slay him as

well, the undaunted friar continued on his way until in the distance he, too, beheld this hamlet of Hawikuh, which his guides assured him was in very truth one of the seven wonderful cities.

The fact is that the place was merely one of the usual pyramidal-shaped adobe pueblos, but Fray Marcos was an incorrigible optimist and as he looked upon the cluster of buildings bathed in the brightness of the setting sun, and not unlikely magnified by a mirage-like effect, he saw it not as it was but as what he desired it to be—a city of golden splendors.

With nothing more to justify his story than this brief glimpse of the Zuñi town, coupled with the tales of his hospitable guides who wanted to please their visitor, Fray Marcos returned to Mexico and reported to the Viceroy that he had seen with his own eyes one of the cities of Cibola, and that all seven were doubtless what they were reported to be.

Upon this report Mendoza organized the most imposing army ever brought together in Mexico and put in charge of it Don Francisco Vasquez de Coronado—he of the golden armor. Accompanied by the inevitable priests, northward moved the glittering column—to secure land for Spain, heathen souls for the church and gold for the Crown—and themselves.

Fray Marcos himself guided the army, following his former route along the San Pedro to the Gila and northeast from there over the mountains. Buoyantly marched horsemen and footmen with no thought of the bitter disappointment that awaited them. Poor little Hawikuh, though stoutly defended, was taken by storm, but there was no gold within the adobe

dwellings for the conquerors. Nor did the Spaniards find gold anywhere during their stay in this new land, in spite of their diligent exploration of the land from the Colorado River eastward to the prairies of Kansas.

They were not kind to the natives—those haughty conquistadores—in spite of the fact that the priests would save their souls. Winter quarters were established on the Rio Grande, near where Bernalillo now stands. Here, goaded to madness by the cruelties of the Spaniards, the natives revolted and as an incredibly cruel reprisal one of Coronado's captains had two hundred Pueblans butchered and burned, thereby implanting a horror and hatred of white men that lay hot in Indian breasts for generations.

And yet the priests of the expedition were wholly sincere in their desire for the conversion of the natives to the Spaniards' God of Peace, and when Coronado and his soldiers, disheartened and discredited, returned to Mexico, Fray Juan de Padilla, a priest, and Fray Luis, a lay brother, remained behind to minister to the Indians. It is not surprising that they suffered martyrdom.

Following several unimportant excursions into the new land, in 1582, Antonio de Espejo made an *entrada* looking for three missionaries who had also ventured to remain alone with Indians after their companions had returned to Mexico. Espejo was a wise and kindly man as well as a firm commander and while he did not find the missing friars, who like Fray Juan and Fray Luis had been murdered, he did by his fair treatment secure the respect and confidence of the pueblo people and gained much valuable information concerning the country, which he explored from the Pecos to the Hopi villages.

His report to his superiors at the close of his journey was conservative and, in the main, accurate. There was perhaps no great amount of gold in the new country, but there was plenty of fine agricultural land for colonization, and he believed the natives would accept Christianity if kindly treated.

For the purpose of settling the country, Don Juan de Oñate, in 1598, with a goodly number of prospective colonists and many head of stock, marched up the Rio Grande. At the mouth of the Rio Chama a settlement, called San Gabriel, the first white one in the Southwest, was established and made the administrative center. In the spring of 1605 the city of Santa Fe was founded and the capital moved there.

The Spaniards, as a rule, continued to treat the Pueblans badly. While the priests desired above all things to save their souls, and many of the friars were kindly and patient, as well as pious men, others were stern disciplinarians who failed utterly to make the instinctively warm-hearted red men appreciate that the God whom the cruel white soldiers invoked before going forth to slaughter, could be an improvement on their own beneficent deities. Still, some converts were made, for we know the natives worked hard and long helping the padres erect well-built monasteries and churches. As for the colonists, their only regard for the Indians seems to have been inspired by the work they could get out of them, and the soldiers treated them with a brutality hard to believe.

These oppressions bore natural fruit when, in 1680, the Pueblans, rising in rebellion, killed twenty-one of the twenty-

three missionaries and drove all the Spaniards—colonists, soldiers and priests alike—out of the country.

The Spaniards came back of course, this time (in 1692) marching under the banners of Don Diego de Vargas who, combining wise diplomacy with a courageous front finally succeeded in reëstablishing Spanish rule. Not a little of his success, it may be said, was due to the fact that he succeeded in enlisting the help of friendly Pueblans in checking the revolts in villages that were especially hostile.

It is reported that when Coronado came to the Southwest there were seventy-one pueblos. The number seems to have continuously dwindled. Torn by warfare and revolt, only two of the pueblos, Acoma and Isleta, it is said, occupied the same sites after the rebellion that they did before; the remnant, with the resumption of Spanish rule, totaling not many more than there are to-day.

The further annals of the Rio Grande colonists are largely occupied with stories of the suppression of minor Indian troubles, of quarrels between Spanish officials, of the endeavors of the settlers to make a living by stock grazing and agriculture and of the efforts of the priests, grown wiser by bitter experience, to Christianize the natives.

Slowly but inevitably the colony grew stronger. Little by litle, as the years went by, its citizens attained a certain amount of prosperity, and the natives were not only brought to realize the futility of trying to withstand Spanish soldiers, but as a whole, those dwelling within the Rio Grande basin, nominally at least, became children of the Church.

CHAPTER X

MISSIONS IN NEW MEXICO

As we have seen, all the missions built by the Franciscans in New Mexico prior to 1680 were either partially or entirely destroyed during the great uprising of the natives at that date. Some were rebuilt, new ones were erected later, and all of the more important Indian pueblos of the state have churches to-day.

As viewed by the casual modern tourist, neither the ruins of the old structures nor the buildings still in use would be considered impressive or beautiful as those terms are applied to a European cathedral; nor, indeed, do they compare architecturally with such mission buildings as San Xavier, in Arizona, or San Luis Rey, in California.

The churches in New Mexico that are gone and those remaining were, and are, plain buildings, including those roughly rectangular and those cruciform in outline, with their monotony of form usually relieved by one or two towers in which bells might be hung. Some of the older missions were built of small, undressed stones set in clay mortar, but most of them, and practically all the later ones, were of adobe, often plastered on the outside as well as in.

Still, when one begins to consider their unpretentious buildings more thoughtfully, he sees in them much not only to commend, but to admire. They were dignified in their

proportions, harmonizing perfectly with their surroundings, and in size and arrangement admirably adapted to the purpose for which they were built.

The problem that confronted the Franciscans here differed radically from that which mission padres in other fields had to solve. In California the natives were degraded savages. In southern Arizona, while the inhabitants were instinctively inclined to be kindly and moral, their habitations were squalid, and their only form of religion was fetish worship and a crude belief in myths. In those places it seems to have been the determination of the missionaries to build temples so splendid that they would not only rouse the imaginations of their neophytes but be something, as well, that would always stand in their eyes as a symbol of the glory and power of the church. Also, owing to the crudeness and poverty of native buildings, it was necessary for the missions to include a commodious refectory, storehouses, granaries and workshops.

In New Mexico the missions were to be constructed in villages where for generations the natives had lived in their well-built dwellings. They had their own granaries and workshops and, in their kivas, their own places for religious ceremonies. Also, the Pueblans were firm in their conviction that their religion was sufficient to their needs.

Naturally, the Franciscans looked upon the worship of the natives as heathenish, and the form of government they followed as something that decidedly needed reformation; yet they were good enough psychologists to appreciate that their best chance for proselyting was to endeavor to substitute in the minds and lives of the Pueblans the new religion for the old with as little friction as possible.

So, in building the churches, while they must be more imposing than the kivas, nothing, perhaps, would be gained by a structure too greatly at variance with the native architecture.

Always among the friars there were men of excellent taste who had a thoroughly practical knowledge of architecture. In deciding to build without ostentation, they blended the simpler forms of colonial Mexican architecture with the ideas of the Pueblans, and in carrying out these plans accomplished something wholly admirable.

Indians, for the most part women, as we know, did much of the actual labor. They cared nothing for mathematical exactness in making a square corner or for the perfection of a flat surface, and in construction the padres did not hold them too closely to the line. There are those to-day who think that the buildings gained something in individuality by this evidence of hand workmanship.

In the adobe churches, owing to lack of strength in the material, there could be no arches, so, following the pueblo style, the roofs were made flat, supported by heavy *vegas,* or beams, which were fashioned by hand from trunks of forest trees about them.

In introducing belfries the friars gave the natives an architectural form they were wholly accustomed to, for towers, both round and square, had been used as lookouts as far back as cliff-dwelling days. The porches and balconies worked into the New Mexico missions also, in a measure, followed pueblo ideas.

It need hardly be said that the use of other materials might have served the padres as well, or better. A universal use of stone or burned brick instead of adobe would certainly

have given greater architectural scope as well as more permanency to the structures.

We may easily understand, though, that there were practical reasons that prevented the builders from burning brick or from using stone. In any event, the adobe made very comfortable buildings.

The first church to be built under the direction of the Franciscans in New Mexico was one hastily constructed at San Gabriel, Oñate's first capital.

The oldest church in the state, and, indeed, in the United States, that is still being used as a house of worship, is the mission of San Miguel, at Santa Fe, erected when the Spaniards began the town there in 1605 and made it their capital.

By 1617, three years before the landing of the Pilgrims at Plymouth, there were eleven churches in New Mexico. A number of others were built soon afterwards.

One of the most notable of the early churches was the one erected on the rock-top city of Acoma and dedicated to San Esteban. After its destruction in the great rebellion it was rebuilt under De Vargas.

Impressive ruins of the old missions can still be seen at Pecos, Abo, Tabira (Gran Quivira), Cuarai, Zuñi and Jemez Springs. Ancient churches of more than passing interest, which are still used, are to be found in many of the pueblos, including Laguna, Zia, San Felipe, Tesuque and, as has been mentioned, Acoma. Equally well worth visiting are those in the Mexican-settled towns of Chimayo, Las Trampas and Ranchos de Taos—all three north of Santa Fe.

CHAPTER XI

MISSIONS IN ARIZONA

N recalling the activities of Spanish pioneers in Arizona a marked difference will be noted in the story here from that related of the Rio Grande district.

After Coronado there were no more formal military *entradas* from the south made into what is now known as Arizona. Indeed, we have no historical record of any European entering this territory for about a hundred and fifty years and then its visitors were Jesuit missionaries, sometimes journeying alone, sometimes in pairs, occasionally accompanied by small escorts of soldiers.

The territory south of the Gila River to the Altar district was the home of the related tribes of Pima and Papago Indians. These tribes formed a buffer state protecting the Spanish settlements in Sonora and southward from attacks of the predatory Apaches who roamed over the country to the north and east of Pimaria.

The peaceable and tractable characteristics of these tribes were early noted by the friars, and during the seventeenth and eighteenth centuries a number of missions were established in lower Pimaria Alta to minister to their spiritual needs.

The first apostle to the Indians of Arizona was a Jesuit priest by the name of Eucebio Francisco Kino, (Chino, some-

times known as Kuehne), who in 1687, established the mission of Nuestra Señora de los Dolores, not far south of the present international border.

In 1691, upon the invitation of a delegation of Sobaipuris Indians, a branch of the Pimas, Padre Kino, in company with Padre Juan Maria Salvatierra, made a visit to their settlements at the present site of the Tumacacori mission. A year later he made his first trip up the Santa Cruz to the Indian village of Bac which is about nine miles south of the present city of Tucson. Here Padre Kino not only found a settlement well populated with friendly natives, but, as well, a tract of very fertile land which the Indians were cultivating with the abundant water found there in the valley of the Santa Cruz.

Always on the lookout for a favorable site for a mission, the many attractions of Bac made a great appeal to Kino, and he seems at that time to have determined to utilize its advantages for an outpost for the church.

Two years later we find him again in Bac. This time, inspired by stories told him by the Indians of an impressive ruin of a mighty house off to the northwest, with an escort of soldiers he went on an exploring expedition which resulted in the discovery (1694) of the now famous Casa Grande, a communal dwelling of the prehistoric canal builders.

It was April or May, 1700, that Kino made a beginning on the mission buildings dedicated to San Xavier, the Indians eagerly doing the work, with Kino personally putting in the corner stone. While the buildings were commodious we may assume that they were constructed of adobe and rather plainly finished.

Besides San Xavier there were only two other missions of

any importance ever established in Arizona, that of San Gabriel, at Guevavi, a few miles northeast of the present town of Nogales, and San Jose de Tumacacori, eighteen miles north of Nogales, both being in the Santa Cruz Valley.

The only buildings ever erected at Guevavi were unpretentious structures of adobe, but, like those of San Xavier, they were of ample size for their needs. They were attacked and partially destroyed more than once by Apaches. The first buildings constructed at Tumacacori were also raided.

Sometime during the mission period there was a station known as San Cayetano at Calabazas, and another at the settlement of Tubac, called Santa Gertrudis. North of Tucson was located San Agustine del Oyaut, and south of that city, San Cosme del Tucson. All of these except those at Bac, Guevavi and Tumacacori, seem to have ministered to comparatively small groups of natives, and none but San Xavier and San Jose were marked by notable buildings.

Prior to 1680 there were several missions or *visitas* in the Hopi country which were all destroyed in the great Pueblo rebellion.

At the time San Xavier was founded, the most northerly of the Spanish *presidios* in this section of Mexico was located at Fronteras, Sonora, near the San Pedro river. Here a troop of cavalry was garrisoned which afforded the missions doubtful protection from hostile tribes, particularly the Apaches, who were ever ready to raid and murder when a time seemed propitious for acquiring loot.

However, in spite of dangers and difficulties, Padre Kino and associate Jesuit friars labored zealously in their fields, helping the natives in a material way as well as attempting to inspire them spiritually.

In 1710, at the age of seventy, active almost until the last in his work for the Indians, this intrepid old soldier of the cross passed to his reward. It is told that during his mission work in present Sonora and Arizona he baptized over fifty-five hundred Indians. In all his journeys, it is said, he carried no other food than parched corn and slept on the ground when night overtook him, his black robe his only covering. As he walked he would often pray or raise his voice in song.

During the thirty years which followed, the lot of the padres was not an easy one. In addition to the constant danger of an attack upon the missions by Apaches, there were many problems to be solved in the training of the Papago and Pima neophytes. Although anything but lazy, and naturally of kindly disposition, they were not used to the white man's steady habits of labor nor the discipline the priests would put upon them.

In their desire to aid and develop them, as well as to have the usual routine work of the missions properly performed, the padres may have asked for more work and less play than the Indians thought a proper mixture. Also, there may have been irritations caused by actions of soldiers and colonists in the settlements farther south. In any event the Papagos and Pimas on September 21, 1751, joined the Seris in a bloody revolt.

The friars at Bac and Guevavi escaped to the *presidio* of Suamaca, in northern Sonora. Two friars were killed at their missions in Sonora, as were about a hundred other Spaniards.

However, with a combination of diplomacy and show of force, after conferences with the head men of the tribes by

the priests, within two years the native parishioners were again upon good terms with the padres, and a *presidio* was established at Tubac near Tumacacori.

Just as the missions were beginning to show some of the fruits of success, in 1767 the Spanish King, Charles III, issued the edict that all Jesuits should be expelled from Spain and its possessions. The missions, of course, were immediately abandoned, until in 1768 they were put under the care of the Franciscans, and to San Xavier was sent Fray Francisco Garces, who was as remarkable a character as had been Padre Kino.

The very year that Garces assumed this position, while he lay ill at Guevavi, the mission building the Jesuits had erected at San Xavier was destroyed by Apaches. As soon as Garces could return, the church was rebuilt. Elsewhere the Franciscans were active in restoring friendly relations between the Church and the natives, and by 1776 the mission of Guevavi, now renamed "Los Santos Angeles," had four *visitas,* including San Jose de Tumacacori, while San Xavier also had one or two.

Padre Garces was an indefatigable missionary. When he visited the native villages he had a servant carry before him a large banner portraying upon one side the benign face of the Virgin Mary, and on the other, a picture of a lost soul writhing in the flames of hell. If, upon visiting a new community the Indians were hospitable he had turned toward them the likeness of the mother of Jesus, but if unfriendly, they were told to gaze upon the lost soul and be warned of the fate of the unbeliever.

By 1772 San Xavier contained, including men, women and children, two hundred parishioners. Its gardens and fields

were well cultivated and its livestock included both milk and stock cattle, as well as horses and burros.

The original village of Tucson was a settlement of Papago Indians located at the base of Sentinel Peak, a short distance west of the present city. Father Kino mentions the place the year before San Xavier was founded, as San Agustine. In 1772 it is again referred to as an Indian village, but now, a *pueblo de visita,* it is called San Jose del Tucson. It contained, including both Christians and heathens, more than two hundred heads of families. At this time Padre Garces built a stone church and a mission house there, surrounding both with an adobe wall as protection against the Apaches.

Tucson, early in the nineteenth century, was beginning to assume importance as a Spanish settlement. Its greatest problem was how best to repulse the periodic attacks of the Apaches. The *presidio* was moved there from Tubac, but even the presence of the soldiers and the adobe wall which surrounded the town did not seem to give it entire protection, and we find the Spanish authorities making a treaty with the Apaches, promising them rations to the value of from eighteen thousand to thirty thousand dollars a year if they would only be good. As a further inducement to righteous living we read that they were encouraged to live in settlements near the *presidio* and taught to drink white man's liquor!

In spite of all obstacles, the colonists did some farming, following the Spanish custom of living in town and going from there to their fields. Corn ripened in the valley of the Santa Cruz, and under careful guard, cattle browsed upon the beans of the mesquite trees.

Trade was carried on between Tucson, Bac, Guevavi and

Tumacacori and the towns in Sonora by means of pack trains. Strongly guarded by an escort, the *arieros* would load their pack mules in the northern settlements with hide, wool, buckskin, rich gold and silver ore and take long journeys over desert, hills and mountains to Hermosillo or Guaymas, bringing back *sarapes, mantillas,* cloth, sugar, imported wines, silver coins and even jewels.

It was during this time that a beginning was made upon the present mission building at San Xavier. We have already noted that the first mission at Bac was started under the direction of Padre Kino in 1700. This building was destroyed by Apaches, rebuilt, destroyed again, and again rebuilt.

It is altogether likely that before their expulsion, the Jesuits, feeling that Bac should have a building worthy of its important station, planned the magnificent edifice that finally marked the site. Indeed, they may even have started work upon the foundation. When the Franciscans took charge of the work they would naturally have modified the plan, but there are so many things suggestive of the pioneer order about the structure that the theory of Jesuit participation is plausible if not extremely probable.

Padre Baltasar Carillo was in charge of the mission from 1780 to 1794, and it seems to have been during his administration that the work of construction commenced. There is a date, "1798," together with the abbreviated name, "Pedro Boj's" (Bojorques) carved upon the sacristal door, which has been assumed to mark the completion of the edifice.

Built about a patio, all the proportions of the mission buildings of San Xavier are symmetrical and noble. The church proper, which bounds the patio on the west, is cruci-

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Photograph from Putnam Studios

THE SPANISH MISSION OF SAN XAVIER—Nine miles south of Tucson, Arizona. Papago women in foreground.

form in shape. Fronting south, it is surmounted by two towers and a central dome. Extending the front line eastward, thus forming a south boundary to the patio, are the cloisters. Another wing of rooms bounds the patio on the east, and a heavy wall encloses it on the north. The courtyard was used as a place of refuge for the women and children of the Christianized Papagos during times of attack by savage tribes.

While the cloisters or dormitory wings are but one story, the church front is high, the distance from the foundation to the top of the domed tower being one hundred and three feet.

The front *façade* of the church is highly ornamented in the style of the Spanish renaissance, the central portion being topped with an elaborate indented arch. Each of the high towers which flanks it, originally carried four bells. While the tower to the left is surmounted by dome and cross, for some unexplained reason the dome on the right never was added.

The front entrance to the church is arched, with the original door of mesquite still in good condition. Four figures in niches adorn the wall; a statue of Saint Elizabeth, one of a Jesuit priest, Saint Cecelia carrying a tambourine, and one of Saint Lucy, beloved of the Indians because, when they burn candles before her, she cures their trachoma-afflicted eyes!

Arabesques in low relief over the entrance, which still show the original dull red, indicate an exterior use of color which must have been strikingly picturesque.

Within the church, the walls and ceilings are covered with notable decorations, and if we wonder a bit at the vividness

of the coloring even in its present faded condition, one is reminded that the work was done to please the Indians who lived in a land of color.

The mountains, hills and deserts were of yellows, browns, and reds, dyed to deeper tints and tones at dawn and sunset. In the spring, in places, wild flowers in vivid colors would cover many acres. The Indians, too, painted their bows and shields, and as well, artistically applied lines of color to their faces.

In the lavish use of color at San Xavier the padres must have rejoiced in this opportunity to address so eloquently the eyes of their parishioners. Perhaps they, themselves, in this riot of tinting found an opportunity to express a personal feeling that their dull robes and equally plain cells denied them.

Many of the murals in the more important places show the work of trained and talented artists, others more inconspicuously placed are naïvely crude, and may have been done by neophytes eager for a part in the great work.

What monumental labor it must have taken to do all this! A thousand Indians are said to have worked upon it during its construction. The foundation was made of heavy bowlders set in natural cement. It is a legend that these stones were found twenty miles away and mostly carried to the building upon the backs of Indian women, who believed it would be "good medicine" for them not to let their stones touch the ground once en route!

The architects and superintendents of the work were largely the priests themselves. Assisting them on San Xavier, we are told, were the two "Goana Brothers," especially expert with brick and plaster. They were masters of their craft.

Practically all the ornamental brick used, including those that form the wonderful frieze in the interior representing the Franciscan cord, bell and pomegranate, were molded before being burned, and put in place just as they came out of the kiln.

Imagine the rejoicing and ceremonials, fiestas and dances when the building was completed! Think what it meant to the Indian neophytes! The only building other than the missions they had ever seen larger than their rude huts was the dull ruin of the Casa Grande. This building was not only still larger, it was magnificent! It was not only stupendous in their eyes, but it palpitated in glowing white and tints! Rising from the brown earth, its glistening radiance dominated the landscape for miles. It was an amazing thing to have been conceived. It was a still more amazing thing to have been executed. Still in good repair, even yet it commands our wonder and admiration.

Just when the beautiful mission building of San Jose de Tumacacori, whose ruins still reveal its original grace of design and workmanship, was commenced, we do not know. There are records indicating that it was probably under construction in 1820 and was being used for services in the latter part of 1822. It is supposed to have been abandoned only a few years after its completion.

A visitor at Tumacacori in 1849 reports that the building was in a fair state of repair, and that in the garden peach trees and pomegranate bushes were bearing profusely. Later, however, the building was vandalized, the roof and part of the imposing tower were destroyed and the interior sacked. In 1908 our Government took over the property, and ten acres with the building was made a national monu-

Ruins of the Spanish Mission of Tumacacori on road from Nogales to Tucson, Arizona.

ment. Under the direction of Frank Pinkley, custodian, a new roof has been completed and the building otherwise protected. All that is left of Guevavi to-day is a dismal group of crumbling abode walls.

Following the completion of San Xavier we may picture mission life on the Santa Cruz at its best. We can hear the mellow tones of the bells filling the air with their music. In the early morning we can see the Indian neophytes, stolid but devout, with uncovered heads and sandaled feet, assemble for matutinal prayers and, the rite once over, watch them as with a clear conscience they shuffle off to their breakfast of *tortillas* and *frijoles* to discuss the horse-race and chicken-pull scheduled for the following Sunday morning.

As the day proceeds we witness the animated picture. At the smithy a vigorous padre, with his gown tucked up out of the way of his feet, may be seen repairing a hinge for a sacristy door; nearby a lay brother is fitting a new point to a wooden plow or fashioning an ox bow which, by the way, will be tied to the beasts' horns. In the fields Indian irrigators stand bare-legged in the water as they divert a stream from the *acequia* to the growing grain.

At noon there are more corn cakes, prayers and *frijoles;* in the afternoon, more work; in the evening mission bells again bring tired laborers to spiritual and bodily refreshment. If the day be Saturday, it may be closed by a *baile* where the Indians will dance upon the hard ground to the music of the home-made violin, flute and guitar and perhaps the native tombé; yet we hear that some of the neophytes, preferring paganism with indolence to piety coupled with labor, would occasionally run away!

Beginning with the Mexican wars for independence from

Spanish rule, the short years of comparative prosperity of the missions in Arizona came swiftly to an end.

From 1811 on, money and food were inadequately and irregularly supplied the soldiers at the *presidio* of Tucson, and the military force became disorganized. Rations to the Apaches were also cut down, and in consequence those Indians promptly resumed their old habits of stealing stock, raiding ranches and murdering settlers.

The padres did their best to hold their neophytes together, but on September second, 1827, came the end of mission days. When Mexico achieved her independence orders were given for the expulsion of the Franciscans and they soon left the country.

In a letter written in 1835, a former commander of the northern *presidios* stated that in Indian raids since 1820 no less than five thousand lives had been lost in Pimaria, and that at least a hundred *ranchos, haciendas,* mining camps and other settlements had been destroyed, and from three thousand to four thousand settlers had been obliged to quit the northern frontier.

A melancholy ending, surely, for a period that promised so much! Guevavi and Tumacacori were deserted, San Xavier under the nominal charge of the secular priest at Magdalena, who could naturally visit it but rarely, and protect it not at all. There was a squalid town at Tubac and another but little better at Tucson.

Still, the proximity of Tucson was doubtless some protection to San Xavier, and the Papagos doubtless did what they could to keep the buildings from being vandalized. While during its years of neglect it naturally went more or less into decay, it never was a ruin.

Bac, by virtue of the Gadsden purchase, became a part of the United States in 1854. Five years later Arizona was included in the diocese of New Mexico, when the bishop's vicar-general was sent on a visit to the Arizona missions. At Bac the Papagos welcomed him with many expressions of joy and ringing of bells. Restoration of San Xavier was begun in 1906 under Bishop Granjon. Most of the work was done by Indian labor and completed in about two years.

MODERN RED MEN

CHAPTER XII

SETTLING THE INDIAN QUESTION

OR something over three hundred years the white people in what is now the United States have been trying to "settle the Indian question." It is still unsettled.

The first method generally advocated and to some extent put in practice, was elimination. While there were a few of the American colonists like Roger Williams and William Penn who believed that Indians would respond to fair treatment, in general it was held that the red man was hopelessly savage and predatory and that the only good Indian was a dead one.

The Indian fighter was a favorite hero of fiction. In the last quarter of the nineteenth century no books of fiction were more enthralling to the small boy than those found in "Dime Novels" or "Nickel Libraries" which told how the faithful rifle of Eagle-eyed Jack barked "and another redskin bit the dust." At such noble exhibitions of marksmanship and valor little Tom's or Jimmy's heart would leap exultantly while Dad would smile his tolerant approval.

Here in the Southwest the Governors of Sonora and Chihuahua at times paid bounties for Apache scalps—so much for a buck, so much for a squaw, and there were plenty of white Americans among the scalp hunters.

The United States first established a permanent agency to

deal with the Indians when, in 1789, in creating the War Department the duties assigned to it included those "relative to Indian affairs."

In 1824 the War Department organized a Bureau of Indian Affairs, and in 1832 the office of Commissioner was created. Two years later under an act to provide for the organization of the Department of Indian Affairs, changes were made in Indian agencies and provision was made for subagents, interpreters and other employees. This was really the beginning of the modern Indian office.

When the Department of the Interior was created in 1849 the Bureau of Indian Affairs was transferred to it. That was about the time when our fathers began to think there were too many obstacles in the way of practically solving the Indian question by elimination, and decided to give concentration—putting the Indians on reservations—a trial. And that was some job, too.

From the beginning it has been a popular sport to hurl rocks at the Indian Bureau. Its policies were poorly conceived, so the critics said, and wretchedly carried out. As for the personnel of the Bureau, every commissioner was incompetent, every department clerk a numbskull, every agent or superintendent corrupt and brutal, every trader a robber, every teacher in the Indian schools an ignoramus. This stone throwing is still one of our major national games.

Of course, in the minds of the critics, all the present policies should be radically changed, if indeed the Bureau should not be abolished altogether. Only, strange to say, while the different schools of present day reformers agree that existing conditions are hopelessly bad, they differ most amazingly as to what constitutes the badness

There are those who believe that the Indian should be made to adopt the white man's customs in the shortest possible time. They complain that the Bureau is altogether too lax and too slow about breaking up old customs. Indians should not only be made to wear the white man's style of clothes, but cut their hair as white men do, brush their teeth with prophylactic brushes, build a white man's kind of house, and in general follow white men's customs. The children should be taken from their parents at as early an age as possible, sent to schools away from the reservations, and when graduated be not allowed to return to their parental homes, but put in a white environment to forget about old customs and savage ways.

A second class of critics say that the Indian is inherently a barbarian; that to attempt to give him a white man's education is to spoil him; that it is impossible to keep him from returning to his own people when he has finished school, and when he does, he immediately reverts to the blanket. The only effect education has upon him, they assert, is to make him "meaner" than he otherwise would be. In general they believe that it is impossible for him to become a white man, and his schooling only spoils him as an Indian. They declare that the best thing to do is to close the schools, turn the Indians loose on the reservations and, except for police supervision, leave them alone.

The point of view of the Apostles of the Picturesque is still different. Indians might be given a certain sort of schooling, but not of the kind to change their original individuality. On the reservations they should be allowed to retain their tribal government, live in their original picturesque habitations, observe their old ceremonies, dance

their old dances, wear the colorful costumes of their forefathers and be encouraged to keep up their arts and crafts. In making such products as blankets and baskets they should not be encouraged to sell them, but retain them for their personal use, as when made for the market it not only resulted in inferior products, but in a way prostituted their art. Most of all they should adhere to their old religion, which is better fitted to their nature than the white man's.

Such a program as this, naturally, does not appeal to critical missionaries at all. Many of them, like the first class of reformers, believe that the Bureau is altogether too easy-going in its efforts to induce the Indians to give up their old ways. All the dances, the "sings" of the medicine men and any other ceremonies that pertained to the ancient "heathen" ways should be stopped and the Government officials should coöperate with them more closely in getting the Indians to go to church.

Then there is the local "practical" citizen. His opinion is that the Indian should be taught, not from books but in the field, so that he might be of some good in the world—might pick cotton, for example, or clean ditches or irrigate for white farmers, while the Indian women could learn to be domestic servants.

These criticisms are not set down to ridicule them, but to show their wide variance and, as well, not only to hint that even an Indian service might have some trouble in trying to please everybody, but also to give the reader an idea of how big the job is that the Bureau has on its hands.

Many of the suggestions made by these various groups, as might be expected, are based on misinformation and misunderstanding and are hopelessly inept and impracticable.

INDIANS THRESHING GRAIN WITH HORSES AT TAOS.

Photograph by Gen. H. F. Robinson

On the other hand helpful suggestions are continually being made by friends of the Indians who know just what they are talking about, and these are productive of much real good.

There is no question that the people of the United States may well blush at some of the attempts made both by officials and private citizens to solve the Indian question. As individuals, members of the white race not having immediate relations with the Indian have been callous and indifferent, and when their interests have conflicted with the red man's, or when an opportunity has presented itself to make money at the Indian's expense they have often exploited him without conscience. Officially, the Bureau has blundered in its policies and broken its pledges, and the criticism is only too true that in times past the list of its agents and other administrators has included both the incompetent and the dishonest.

Under the spoils system the Bureau was at its worst. Men, as we all know, were given positions not because they knew anything about the Indians or had their welfare at heart, but to pay political debts. On the other hand, from the very beginning, there have been many able people in the service, both men and women, who have proven themselves unselfish and untiring in their efforts to help these wards of the Government.

It is easy to recognize mistakes after they are made. The Indian question was never an easy one. It was an uncharted sea full of treacherous currents and unsuspected shoals. No matter in what channel an administrator might steer his course, it seemed to be the wrong one. It would have taken an executive with an infallible intellect and an unfailing judgment to make plans that contained no errors.

The Indian agent, or superintendent as he is called now, being the representative of the Government who comes into direct contact with the Indian, is the man who receives the most censure.

It was not an easy position to fill in the old days—this job of holding down several thousand fighting savages—when any morning, even if the agent didn't wake up to find his throat cut, he might discover that half his charges had escaped from the reservation and were marking a red scar of death across the country.

Even in these days of comparative peace it is not wholly an easy situation that presents itself when a superintendent is told by a subordinate that the night before a group of braves had filled themselves with tulapai, or some other sort of firewater, had killed an Indian woman reputed to be a witch, and the only police on the reservation are Indian friends of the murderers who had taken part in the spree. It is not an easy matter for a superintendent to clean up an epidemic of smallpox among a lot of people who know as much about sanitation as they do of the principle of relativity, and where the native medicine man is supreme.

From the very nature of his position the Indian superintendent must be given large powers in order to produce satisfactory results. If he is big enough for his job he has a wonderful opportunity to help his wards; if he is a man of small caliber he is apt to develop into a petty tyrant and do a lot of harm.

In observing the work of the Indian Bureau even the most captious must admit that for more than a decade its service has steadily improved, and while mistakes are still made, and the incompetent still found among its personnel, efficiency

has become the rule and blunders the exception, and those who know its work best find most to commend.

Whenever I hear a man say that education is wasted upon an Indian, that he is inherently a barbarian and no amount of schooling will ever change him, a picture comes before my inner vision, dater early in the Christian era, where a lot of savage prisoners of war from the forests of northern Europe are herded in a Roman army camp. A couple of legionaires are inspecting them.

"Look at 'em, Porcius," says Brutus. "Aren't they the wild lot! Look at their long hair and painted faces! Wonder when they washed last! Get the bull horns on their headdresses! Look out for their skin mantles! The fur is inhabited! Honestly, do you think those chaps are really human? The General thinks he can civilize them. If he'll take a tip from me he'll make a reservation out of these woods and keep the brutes right here."

And those savages were of course the ancestors of those of us who take such pride in our Nordic stock, and the commentators upon the possibilities of our ancestors acquiring culture were forebears of the people we now elegantly designate as Dagos or Wops.

No race can step from barbarism to civilization in a day. It took us whites quite a while to make the journey. There are those who believe that even the best of us haven't reached the terminus yet.

When we consider the colorful personality of the Indian, his unique costumes, his dances and other appealing ceremonies, it is easy to appreciate how the Apostles of the Picturesque would wish them unchanged. Nevertheless, one cannot hold back the hands of the clock with an Indian any

EAGLE DANCE—SAN ILDEFONSO INDIANS—NEW MEXICO. *Photograph by Gen. H. F. Robinson*

more than with a white man. The life of the antebellum Virginia planter was one of grace and charm, but it could not be retained. The conditions that made it possible have passed.

Village life in New England or the Middle West, as some of us knew it in the latter part of last century, presented a quaint and interesting picture. With tender recollections we conjure a picture of young men with their seductive side-burns, their carefully blacked boots and gorgeous bow ties; the young women with their sweeping skirts and bustles, their hair done in waterfalls, upon which perched an absurd hat adorned with an absurd stuffed bird. With kindly reminiscences we call to mind the Sunday afternoon buggy rides, the picnics and "kissing games," the strawberry and ice cream sociables and the romping square dance. Can't you imagine an educated Indian of to-day, upon being told of this half-forgotten life, suggesting that a reservation be set apart some place, say in central Illinois, peopled by a carefully selected group of whites for the purpose of perpetuating these customs?

I am afraid, though, that it is impossible, if for no other reason than that Henry Ford and the makers of safety razors would so object to it. Equally impossible is it to keep the Indian as he was. Many a "brave" likes overalls better than a loin cloth because they keep burrs from sticking into his legs, and his wife has a wholly incomprehensible fondness for French heels. Sad, but it's so.

I whole-heartedly agree with the Apostles of the Picturesque that every possible encouragement should be given the Indians of the Southwest to pursue their old arts and crafts. I trust that the shamans among the Navajos will

long continue to make their mystical sand paintings, the women to weave artistry and possible mysticism into their blankets. I want the Hopi men to keep on weaving kilts and girdles for themselves and ceremonial dresses for their women, fashioning, as well, their unique masks and katchina dolls; and the women to retain their skill with pottery and woven plaques. I want the Pima and Apache women to keep on making their fine baskets, and would like to see all our Indians retain as many of their ancient ceremonies as are in keeping with a rational cultural advance.

As to the danger that may come from their commercializing their various crafts, I believe that the Apostles of the Picturesque are unduly alarmed. Just as Sargent would put as much art into a picture he might paint to sell as he would into one for his own walls, so will an Indian woman, if properly encouraged, do as conscientious work upon basket or olla for a discriminating dealer as she would if she planned these handicrafts for her personal use.

With some of their secret dances there is a suggestiveness, not to use a plainer word, that the growth of good taste and fastidiousness will naturally eliminate. These deletions will not injure the dances either from an artistic or traditional point of view. Ceremonials and customs with the Indians have always changed with passing years, and it would be a natural sequence of the acquiring of higher standards to have the psychic significance of their ceremonials emphasized and the coarser parts eliminated.

CHAPTER XIII

SOUTHWESTERN TRIBES

SOME day I am going to write an entire book about the fascinating Indians of the Southwest. The plan of this volume, however, provides space for only some of the more important things about them.

It is difficult to condense without, at times becoming rather baldly statistical. These red men, though, are in themselves so picturesque that I am hoping that some of that elusive quality will insist upon mingling even with my brevities. After all, in talking about almost anything, Just a Little has undeniable advantages over that familiar bore, Too Much.

Out of the 349,595 Indians now in the United States, using figures compiled by the Indian Department in 1925, 43,950 are living in Arizona and 22,481 in New Mexico. These include members of fourteen tribes, not a few of which differ from each other in appearance, habits and characteristics as much as Scotchmen differ from Italians. The numbers of the different tribes in Arizona are: Navajos, 21,593; Apaches, 5,631; Papagos, 6,103; Pimas, including less than 200 Maricopas who share their reservation, 5,413; Mohaves, 892; Mohave-Apaches, 206; Chemehuevis, 242; Havasupais, 184; Paiutes, 511; Walapais, 456; Hopis, 2,443; Tewas, 276. There are also about 2,000 Yaquis, immigrants from Mexico, who are not under the care of the Indian Bureau, and 836 Yumas in California just across the Colorado River from

Photograph by Gen. H. F. Robinson

NAVAJO SUMMER CAMP—WITH TYPICAL BLANKET LOOM.

Yuma, Arizona. In New Mexico there are 10,000 Navajos; 1,291 Apaches and 11,190 Pueblans.

The Navajos were originally Athapascans, migrating to the Southwest not many generations before the arrival of the Spaniards. They were a bold, aggressive people who in the early days raided the fields and granaries of the pueblo Indians and stole their women. When the Spanish colonists started farming, with large impartiality these Bedouins of the Painted Deserts also included the chattels of the white men in their predatory forays, laying special tribute upon their flocks of sheep and goats.

The acquisition of these animals gradually wrought a great change in the habits of the tribe. Steadily the purloined flocks increased. The Navajos became a pastoral people, and after a century or more of dearly acquired experience, including some severe discipline administered by United States troops, they learned to appreciate the rights of ownership, especially when such rights pertained to sheep belonging to themselves.

To-day the number of their sheep runs well above two millions and, besides, they own 100,000 or more goats, nearly as many cattle, and about 70,000 horses. In one year their silversmiths sold $25,000 worth of handmade articles, while the famous blankets of their women brought in $250,000. Adding materially to the wealth of the tribe are valuable oil wells now being operated on the reservation.

As the braves always made wives of the pueblo women they stole, the new blood thus introduced added many fine qualities to the parent stock. Also, in the early days bold warriors of other tribes may have allied themselves to the tribe. That the present-day Navajo descended from some

Photograph by Gen. H. F. Robinson

NAVAJO MOTHER AND CHILD—Mother wears a white-man-made blanket, but native moccasins. Baby is well strapped in.

such mingled ancestry is seen in the fact that some of the tribesmen are short, others tall; some lean, others more inclined to take on flesh; all, however, both in appearance and action, exhibit marked strength and virility.

Navajo men now wear the usual shirt and trousers of their white neighbors, but generally retain the native red moccasin, and some of them still twist the ancient bandeau about the brows instead of covering the head with a hat. The women are fond of velveteen jackets and always appear in voluminous skirts reaching to the ankles.

Both men and women wear their hair long and tied in a "bun" at the back of the head. Both sexes, too, are fond of silver adornments of native manufacture, many of which are set with turquoise. These include belt slides for the men, and buttons, bracelets and rings for both sexes. Men and women alike also wear many-stranded necklaces of pierced-shell disks, or beads of turquoise, coral or silver, and occasionally complete their display of jewelry with pendants of turquoise at their ears.

The women occupy prominent places in the family life. With the assistance of their children they do much of the herding and are often the personal owners of the sheep and goats. If dissension occurs between husband and wife—or wives—for there are still cases where there is more than one, and the lady or ladies are, so to speak, "fed up" on friend husband, his personal belongings such as saddle and blanket are placed outside the hogan door, when custom decrees that the man must go.

There were about 9,000 Navajos in 1867; they number now probably upwards of 34,000, with their number steadily increasing. No vanishing race here!

For centuries the Apaches were a scourge across the face of the Southwest. Their vocation was robbery, their avocations, torture and murder. In frontier times, from the Pecos to the Colorado, they ambushed travelers on every overland trail, levying bloody toll upon emigrant trains, freight wagons and stage coaches. They raided the camps of hunters and trappers, miners' cabins, ranches and even the smaller towns; and they were as competent in the business of pillage and covering their tracks upon retreat as they were cruel.

For more than one hundred years the Mexican troopers, for all their superior fighting ability and endurance in pursuit, were unable to hold them in check, and with the American occupation, it was not until forty years were consumed in campaigning that the soldiers of the United States army succeeded in stopping their almost continuous depredations. Finally, in 1886, after a chase perhaps unprecedented in all Indian warfare for unrelenting pressure, the last band of insurgents was rounded up. The incorrigibles forming it were deported from the country and for years held as prisoners of war.

It has been asserted by critics, whose judgments have been guided by sentimentality rather than facts, that the Apaches never would have started upon their bloody career if white men had not first wronged them and stolen their land.

There were white men on the frontier, both Mexicans and Americans, who, in all conscience, were bad enough, and who fought the Apaches as mercilessly as the tribe fought them. But, even so, the arguments of the sentimentalists lose their force when it is recalled that the Apaches, aliens in the Southwest, came to the country not long before the *entrada* of Coronado, and upon their arrival commenced

appropriating, without any compunctions whatever, territory heretofore occupied by other tribes, frankly claiming possession by right of conquest.

However, in justice to the Apaches, it must be said that all members of the tribe were not equally predatory. The tribe was composed of many bands, some of which did but little raiding, occupying their time rather in hunting and the casual raising of corn. Naturally the reputations of all suffered from the actions of the more turbulent groups. Indeed, attached to the United States Army, Apache scouts, though themselves not always above reproach, gave invaluable aid in campaigns against insurgent bands.

To-day the Apaches are redeeming their past. There never was any question about the keenness of their intellect; the task of those who would aid them has been to get their undeniable abilities turned in the right direction. Under the leadership of wise white administrators in the Indian service that is what is now being done.

Hostility to the white man's school in the minds of reactionary parents has been largely overcome, and though many families still live in the same sort of flimsy and dirty wickiup as did their ancestors, standards of living are being raised.

A serious problem on the Apache reservations has always been how to keep the Indians rationally employed, as too much leisure inevitably results in the drinking of tulupai—a dangerous home-brew—and much gambling.

On their reservations, two large ones in Arizona and two smaller in New Mexico, both located in the mountains, there is but little land that is suitable for agriculture. However, they include fine ranges for stock. For a number of years the Indians, both tribally and individually, have possessed

Photograph from Putnam Studios

APACHE INDIANS.

good herds of cattle and many (too many, economically speaking) horses and burros. Looking after cattle on a range, except at certain seasons, does not occupy much of an owner's time. On the other hand, sheep need continuous personal supervision, so a few years ago the Apaches, especially on the New Mexico reservations, were helped in the purchase of small flocks of sheep. As a result, not only has the material wealth of the Indians been greatly increased, but the morals of the tribe have improved and all of them are much healthier.

Apaches are not afraid of work. The young men go in search of employment away from the reservation, and as laborers in road and canal construction, and in similar employment, are making excellent records. Many of the tribe were employed in building the Roosevelt storage dam on Salt River; many more are having a part in the construction of the Coolidge dam, near their homes, on the Gila.

While their journey toward better things may be said to have only well begun, the progress they have already made is most encouraging. Those who know them best, their reservation superintendents and their teachers in the Government schools, are the most enthusiastic over their future.

Descendants of the prehistoric cliff dwellers and their contemporaries who found homes in the equally unique communal dwellings in the open, heirs to the ancient culture, the pueblo Indians of the Southwest, are unquestionably the most picturesque and interesting red men of America.

There are eighteen villages or village groups of them in the Rio Grande drainage, belonging to two definite linguistic stocks. Besides these there are the Zuñi communities of

western New Mexico and those of the Hopis of northern Arizona, each with a language of its own.

We have already become well acquainted with the ances-

Photograph by Gen. H. F. Robinson

IN ACOMA—PUEBLO OF THE SKIES—Temporary pool made by rains.

tors of these people, and now may note with interest that they still retain many of their ancient manners and customs.

While their apparel naturally has been modified by contact with white neighbors and the convenience of machine-woven dress goods and ready-to-wear overalls, it is still individual-

istic and colorful. In some of the villages the men wear trousers and shirts fashioned from bright-colored cotton print, the skirts of the latter often hanging gaily over the former. Both sexes like to wear moccasins, the women adding puttees, padded underneath, giving a unique stove-pipe effect to their legs. The ladies, too, usually wear a bright-colored apron over their short skirts and an equally gay-colored shawl draped over the head. As among the Navajos, both sexes of the Pueblans are fond of wearing native-made silver buttons, bracelets and rings, often set with turquoise. Nearly all of them also wear many-stranded necklaces.

In stature these people are shorter than the average camp-dwelling Indian; they are also lighter in complexion and with more finely molded features. Some of them look decidedly Asiatic.

While there are many minor differences in the characteristics of the inhabitants of the different pueblos, nearly all of them are notable for their cheerfulness, courtesy and hospitality. When visitors enter a village, if they are properly accredited and refrain from exhibiting that large air of condescension and offensive patronage, alas, too often seen among the average tourists, their gestures of greeting and smiles will be answered in kind, and their courtesy fully matched by the manners of their hosts.

All of the pueblos are worth visiting. Acoma, a thriving city centuries before St. Augustine was founded, is built upon the top of an isolated mesa 357 feet above the plateau floor below. The Hopi villages are perched upon three finger-like mesas whose outside streets, in places, overlook cliffs nearly five hundred feet to the bottom.

Photograph by Gen. H. F. Robinson

ACOMA WOMEN IN A VILLAGE LANE.

Taos, Zuñi and Walpi are all built in the ancient communal, pyramidal style of architecture.

Following the ancient customs, the Pueblan women, for the most part, built the adobe family dwellings, plaster them, and are very much their mistresses.

The floors are usually of clay, but so hard and glossy that the visitor at first glance gets the impression that they are some kind of concrete or asphalt. Just how the women artisans secure this result is something of a mystery. The mud-plastered walls are often whitewashed and marked with a low wainscot of yellow ochre.

The amount of furniture naturally varies according to the wealth of the family and the progressiveness of the village. With a well-to-do family in a modern village like Laguna or Isleta the furnishings would do credit to the home of a prosperous white mechanic. In poorer Hopiland or in reactionary Santo Domingo there might be but little more than a table, a kitchen chair or two, some boxes for cupboards and a number of gaily-colored blankets or sheepskins hanging from a long pole swinging horizontally from the ceiling, which at night will be spread upon the floor for beds.

The first sign of progression in a family is often seen in the presence of a cook stove and a sewing machine, these usually appearing before bedsteads or dressers. All of the pueblos have plazas, or widened streets, where dances and other ceremonials are held. Adjoining or near most of the towns are tiny cultivated fields where, usually by the aid of irrigation, the Indians grow corn, wheat, beans, squash and melons. Also there are apt to be some fruit trees and grape vines. Corrals, located in the pueblos, will enclose horses and burros, and grazing in fields or on ranges not far away

HOPI GOSSIPERS.

Photograph by Gen. H. F. Robinson

will often be found cattle, sheep and goats. Hopis keep turkeys and often eagles, for their feathers. Practically all the Pueblans raise chickens, and without exception there will be a good crop of dogs.

A pueblo, too, will always contain one or more ancient kivas, and nearly always a church, some of whose foundations

Photograph by Gen. H. F. Robinson

LIVING ROOM IN ZUNI HOUSE—With murals by native artist.

may have been laid a century or more ago. A modern feature that even the most incorrigible devotee of Things-as-They-Were can scarcely look upon without approval is the inevitable Governmental school.

In the matter of police regulations upon the eighteen pueblo reservations of the Rio Grande drainage in New

Mexico one finds a condition unparalleled on any other Indian reservation in America. In practically all the others the title to the reservation is retained by the federal government. In these New Mexico pueblos almost all the land is

Photograph by Gen. H. F. Robinson

Indian women at the grinding stones (matates), Cochiti, N. M.

owned by the Indian communities themselves, having been conveyed to them by royal grant when the Southwest was a province of Spain; the titles were confirmed in 1864 by our government.

When New Mexico became a state it relinquished legal jurisdiction over these pueblos, leaving the administration of justice therein to the federal courts which, however, only

concern themselves with acts involving felonies—that is homicide, arson, burglary and the like.

As a result the regulation of town government, including minor police control, even when white people are concerned, is left wholly to the Indians themselves, who act through the administration of native officials elected annually. The active executive is the pueblo governor, or mayor, who is given power by his constituents to put in force local regulations and punish delinquents.

When dealing with matters involving only Indians, in practice this arrangement works fairly well. The Pueblans regard the office of governor as one of grave responsibility, and usually only men of intelligence and good judgment are elected to the position.

In former times, if the offense seemed to warrant it, delinquents were whipped. Nowadays, punishment usually consists of some sort of a fine—the offender, for example, might be required to do an additional amount of communal labor such as that involved in the upkeep of the pueblo irrigation canal.

In matters concerning white people the present arrangement might not always prove satisfactory. If a visitor at a pueblo should attempt to take a photograph and an Indian, resenting his action, should smash his camera, or if the visitor should become involved in an altercation with a native and the Indian—sober or drunk—should slap his face or otherwise mistreat him, just so a felony was not committed, as matters now stand, that visitor would have no recourse whatever in any white man's court.

I do not mean to imply that Pueblan Indians are inclined to be quarrelsome with visitors. As I have already said,

Photograph by Gen. H. F. Robinson

Hopi maiden with her hair arranged in the ceremonial "squash blossom."

Photograph from Putnam Studios

PIMA BASKET MAKER—Photograph taken twenty-five years or more ago, when the Pimas still lived in "kees."

properly accredited guests are usually hospitably received. Nevertheless the legal status of the white visitor is as I have stated it.

Parenthetically it may be said that the wise tourist will obtain permission from his Indian hosts before attempting to take pictures. Cameras in the hands of presuming

Photograph by Gen. H. F. Robinson

PIMA INDIAN FAMILY GROUP—Photograph taken in 1900. Now Pimas dress like their white neighbors and live in comfortable adobe houses.

visitors have been broken more than once by angry red men. The taking of a picture in one of their villages, unauthorized, is considered by the native an impertinence and an affront. Often the matter of pecuniary compensation has something to do with the case.

The Pimas, an agricultural people for many centuries, still cultivate the fields of their ancestors along the lower Gila

River, growing the usual Indian crops and possessing small herds of cattle and horses. In pre-Columbian times they grew a native cotton from which they made blankets.

After the Apaches came into the country, the Pima fields and granaries were esteemed by that predatory tribe as prizes especially worthy of their raiding ability. The Pimas,

Photograph by Gen. H. F. Robinson

NINETEENTH CENTURY PAPAGO DWELLING—Before education altered tribal taste in architecture.

however, while seldom aggressive, were brave and skillful warriors, and by maintaining a continuous sentry system usually prevented their being taken by surprise. It was a rare occasion when the Apaches were not turned back discomfited and without spoils.

In the eighteenth century, the Pimas, and their allied tribe, the Papagos, assisted the Spaniards in a defensive war-

Photograph by Gen. H. F. Robinson

A PAPAGO GRANDMOTHER OF THE NINETEENTH CENTURY.

fare against the Apaches, and in the nineteenth century, the two tribes gave equally efficient aid to white Americans.

Now, the Pimas are among the most advanced tribes of the Southwest, living in comfortable adobe houses, using modern methods in farming, and sending their children to school.

The Papagos have a skill at dry farming that is the despair of the white man. Their reservations are situated on the deserts of southern Arizona between the Southern Pacific railroad tracks and the Mexican border. Here, where the thermometer at times reaches 115 degrees in the shade, utilizing a scanty rainfall and supplementing it with waters ingeniously drained from lands on higher slopes, they raise annual crops of corn, beans, squash and melons. They also find many edible products among the forbidding plants of the desert, prominent among which are the fruit of the sahuaro (giant cactus) and mesquite beans.

The Mohaves and related Yumas are stalwart people—perhaps the tallest and heaviest Indians in America. In the old days, while usually not given to raiding away from their own territory, they were often untrustworthy in their relations with the whites, and when tempted by valuable belongings of travelers, would frequently not only rob wagon trains, but add murder to thievery.

These two tribes today are rapidly becoming civilized, and their many native fine qualities are asserting themselves. They have little fields in the Colorado River bottom, and engage in various sorts of labor. The younger generation is going to Government schools, where the young men find

Photograph from Putnam Studios

Mohave Indian woman grinding corn on matate.

in football a fine outlet for physical activity, their great brawn and muscle making them all but invincible in the games with other tribesmen.

A situation pregnant with trouble-making possibilities on many of the reservations is created by the presence of the white bootlegger.

As with the white man, among Indians there are both good citizens and bad. Even a normally well-disposed Indian becomes potentially dangerous when intoxicated, while a bad man drunk, immediately becomes ripe for assault and homicide. Indeed not a few killings by red men both of their fellows and of whites is directly traceable to drinking alcoholic concoctions that are the rankest of poisons—the kind of stuff that the hyperbolist insists would make a cottontail bite a mountain lion.

In trying to suppress this evil, white officials usually have the support of the better class of Indians. Indeed, in some localities, such as certain of the pueblos, the Indian governors themselves have successfully discouraged the practice by imposing severe punishment upon any Indian found drinking.

The situation is especially bad in certain places on the Navajo reservation where the Indians have money enough to pay liberally for their poison, and the territory is so large that apprehension of delinquents is difficult.

While all Indians in the United States are now citizens it has been ruled that the only ones eligible to vote in state and national elections are those who maintain a residence off the reservation.

CHAPTER XIV

IRRIGATION FOR INDIAN FIELDS

F all the efforts made by the United States Government to improve the living conditions of its native wards nothing has been done that has achieved more immediate and noteworthily beneficial results than the activities of the Indian Irrigation Service.

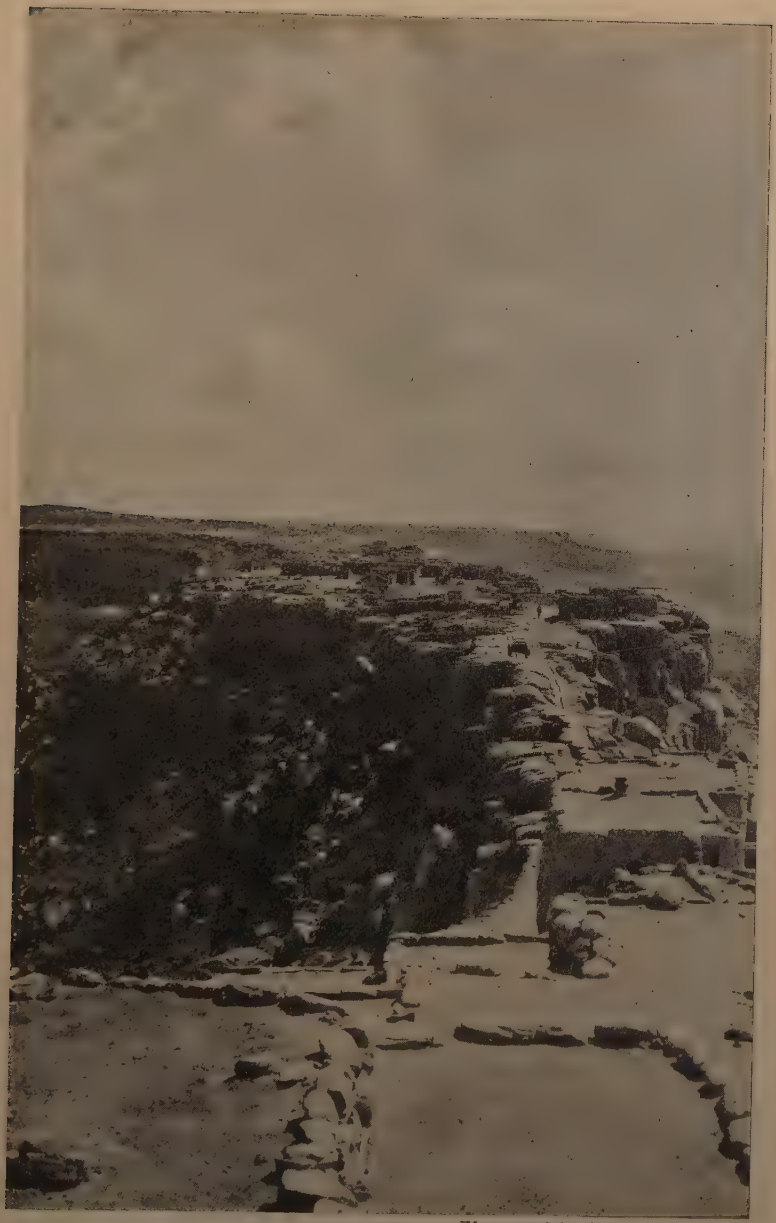
Starting with a small force and with a limited amount of money set aside for their use, for over a quarter of a century the men constituting this agency have worked skillfully and untiringly to develop water for domestic purposes, for stock and for crop irrigation. To this end they have improved the flow of natural springs and seeps, arranged them so the water would not be contaminated, sunk wells and constructed storage and diversion dams and irrigating canals.

For many years this work in New Mexico and northern Arizona has been under the supervision of Gen. H. F. Robinson, with headquarters at Albuquerque, and in southern Arizona and California by Herbert V. Clotts, with headquarters in Los Angeles. Both districts are under the general control of W. H. Reed, chief engineer, and Charles R. Olberg, assistant chief engineer.

Typical of its activities is the work this department is doing in the Hopi and Navajo reservations. Walpi, one of the principal Hopi villages, is situated at the apex of a wedgelike cliff towering six hundred feet above the land

Photograph by Gen. H. F. Robinson

ACOMA WOMEN GETTING WATER THROUGH HOLE IN ICE IN VILLAGE RESERVOIR.



Photograph by Gen. H. F. Robinson

FIRST MESA FROM THE HOUSETOPS OF WALPI, 600 FEET ABOVE VALLEY.

below. Ishpi Spring at the bottom of the valley to the east, and Toveski Spring on the west, formerly had scant and uncertain flows. In dry summers the water would seep into the basins so slowly that a Walpi woman would have to sit around perhaps for an hour or more, waiting in turn before she might fill her jar, when, fastening it in her shawl at her back, she would begin her mile walk up the steep trail to her home.

Considered as a source of water supply for human beings the sanitary condition of the springs was wholly impossible. The wind blew filth into them, wild animals, dogs and burros would drink there, and children unconcernedly might cool their feet in the scum-coated waters.

Under the direction of the efficient local engineer, A. H. Womack, the springs, after being thoroughly cleaned, were walled about and covered, rendering future contamination impossible.

Before the work was undertaken the people of the village were periodically afflicted with enteric diseases, which the physicians in charge traced directly to the water. Since the springs have been put in proper condition this sickness has disappeared.

On the Second Mesa to the west are located the villages of Mishongnovi, Shipaulovi and Shimopovi. Toreva Spring in the valley at the base of the cliff not only provides water for these towns, but for the Toreva day school as well.

Here, if possible, the condition of the spring was even worse than at the springs of the First Mesa. This, too, was cleaned, rebuilt and put in sanitary condition.

After investigating the situation, the engineers believed they could still further aid the villagers here by building

Photograph by Gen. H. F. Robinson

THE HOPILAND FLUTE FRATERNITY—Returning from the village spring following their semi-annual ceremony.

on the top of the mesa a catchbasin for summer rains. The necessary money for the work was secured and the basin put in. As a result, for the first time since the villages were built many centuries ago, the women in these three towns are saved a toilsome climb of a mile for every precious jar of water brought to their houses.

It must be kept in mind that many of these springs of the Hopis are sacred shrines. When the work on them was started, the villagers were fearful lest such sacrilegious proceedings would so offend the water gods that they might either withhold some of the flow, or stop it altogether.

However, Engineer Womack diplomatically assured them that he, himself, was "some" water-priest, and stood high in the favor of the gods of the precious fluid, and therefore there was no cause for alarm.

When the results verified his prediction, the Hopis, instead of being passively hostile, were not only willing, but eager to assist in the work. Now in every village there is an organized force that may be called upon at any time by the white water-priests to assist in the work for water development.

As vital as the work that has been done on the springs has been to the Indian, even more important and far more extensive in its scope is what these white water-priests are accomplishing in well drilling.

In the Hopi and Navajo country there are large areas where, in spite of the limited rainfall, feed for sheep and cattle is fairly abundant, but where there is no drinking water for either stock or humans. In 1910 the white water-priests started drilling wells in such sections, erecting windmills and installing tanks from which, by the turn of a faucet,

Photograph from Putnam Studios

HOPI FLUTE CEREMONY—To increase the flow of the village spring. Religious rites similar to this have been observed by the cliff-dwelling ancestors of the Hopi Indians since the time of Caesar.

water could be diverted into drinking troughs. Think of what water service like that must mean to those Indians!

About twenty-five miles north of Gallup, New Mexico, the white water-priests believed they could find artesian water. After heart-breaking experiences with adverse conditions in drilling, at one thousand feet, their hearts were gladdened by a flow that gushed to the surface in a splendid flowing stream. A number of other artesian wells in this vicinity were afterwards brought in at depths varying from 350 to 550 feet.

For many generations the villagers in the Rio Grande basin have been building small diversion dams and irrigation ditches, watering their fields from the main river or its tributaries. In most instances all the Irrigation Service has found it necessary to do is to better their present system by such methods as improving headgates and dams, concreting ditches and planning for future development.

In irrigated countries, too, where land has been watered copiously for many generations, bottom lands are apt to become water-logged. This has happened in certain localities on the Rio Grande, where the Service has come to the rescue of the Indians with drainage systems.

At Zuñi, natural conditions were favorable for the construction of a storage reservoir of a magnitude far beyond the capacity of the Indian farmers to build, which would greatly increase the acreage of lands capable of cultivation.

After careful investigation and planning the Service built a splendid rock-filled storage dam of modern type, which created a natural reservoir, impounding water enough to irrigate 5,000 acres of land.

Encouraged by the results accomplished by the great

Roosevelt reservoir and water system constructed by the United States Reclamation Service on Salt River, the Indian Service has been authorized by Congress to construct a reservoir dam on the Gila that will hold water enough to irrigate from eighty thousand to one hundred thousand acres.

Photograph by Gen. H. F. Robinson

ZUNI KITCHEN GARDEN—Each housewife has one, which she waters by hand.

This is known as the Coolidge Dam, and is being constructed in a box canyon not far from the San Carlos Apache Indian Agency, in Arizona. Part of the water thus stored will go to white farmers, some of whom have existing rights, but the primary purpose of the system is to supply water to the Pima and Maricopa Indians on their principal reservation.

In the old days water ran in the bed of the Santa Cruz river much of the year. On the San Xavier reservation, ten miles south of Tucson, the Papagos were able to get water from the river to their fields through an ancient *acequia* that may have dated from mission times. Prior to 1914, erosion in the river's drainage area lowered the water level so their ditches could not reach it. The Irrigation Service installed five pumping plants and operated them for several years. In 1924, however, by means of an infiltration pipe line which the Service put in, the Papagos were again able to get water by gravity.

The Service also sunk wells for stock and domestic use, and in a small way for irrigation, in other sections of the Papago reservations and in the Pima country as well.

COCHITI INDIAN DANCERS AT CHRISTMAS FIESTA. *Photograph by Gen. H. F. Robinson*

CHAPTER XV

DANCES AND OTHER RELIGIOUS CEREMONIES

RELIGION, with primitive man, was largely concerned with his relations to the mysterious forces of nature that surrounded him—forces which he early personified as spirits or deities. Thus the sun might be a god and the thunder the voice of a god. The sky might be a god-father, the earth a god-mother and when, with the falling rain, they mated, the fruits of the earth were the children.

The sun was a god or spirit all-powerful. At will he could drive away those malign spirits, darkness and cold. He was the father-god, giving warmth to their bodies, suppleness to their muscles and courage to their hearts. As each morning he rose in his majesty the medicine men greeted him with invocations and petitions, reminding him that the tribal members were his sons and daughters.

Demigods were often by-gone heroes or deified animals, and in their religious ceremonies men would masquerade to represent them. It was desirable to bestow gifts upon the kindly gods, that benefits might be received in turn; also, manifestly, it would be equally important to keep the evil ones propitiated so they would refrain from injuring one.

Some of the gods, it can well be appreciated, might not understand one's tribal language, so it would be safer for the petitioners to act out their desires in pantomime, or a shrine might be set up, plain enough for any god to see, and ornamented in a way to please the most grouchy of

Photograph by Gen. H. F. Robinson

A HOPI MASKED DANCER.

Courtesy Santa Fe Railway Co.

THE BUFFALO DANCE—Tesuque Indian pueblo, New Mexico.

them, before which offerings could be placed. These might consist of such things as little bunches of feathers tied together, sacred cigarettes, miniature bows and arrows, all with tremendous esoteric significance.

Different clans might have special deities of their own. The members of one might be spirit brothers to the badgers, another, relatives of the eagle. All Pueblans would have animals mediate between them and the higher powers. Animals were nearer to nature than man, so animals in the spirit could help man in many ways. The bear was far stronger, the elk could run more swiftly, the eagle could rise through the air to the clouds. Aided by no weapons whatever the mountain lion was far more skillful in overtaking his quarry and vanquishing it than an unarmed human. So the Indian sought the aid of the animal-spirit to help him in his hunting. This could be accomplished by magic. One way was while hunting to carry a small image of some powerful game pursuer like the mountain lion, to which should be tied an arrow point. Also certain rituals should be followed in its use—upon starting out, at the sight of the quarry and after the kill.

There was, however, no more important avenue of communication open to the gods than the language of pantomime, of gesture, of symbolism expressed in costume, action, music and rhythm. This easily explains the purpose of the dramatic ceremonies of the Indians of the Southwest, many of which still survive, and which are usually referred to by the whites as "dances"; they are petitions to the ancient native gods.

Naturally the symbolism expressed in these ceremonies,

Photograph courtesy Santa Fe Railway Co.

THE EAGLE DANCE—Tesuque Indian pueblo, New Mexico.

and the elaborateness and picturesqueness with which they are presented, vary widely according to the cultural level of the tribe and the imagination of their native priests or medicine men.

The dances observed in former days by many of the nomadic or camp-dwelling Indians were often simply savage orgies, like the scalp or war dance or, at best those observed to bring success in hunting or to ward off impending disaster. On the other hand, imaginative, artistic tribes like the Pueblans had literally hundreds of ceremonies expressing an amazing number of poetic ideas, the symbolism of which would be dramatically portrayed by dancers arrayed in striking costumes. These might include petitions that springs might not fail, that crops would flourish, or perhaps they would be thanksgiving ceremonies in recognition of bountiful harvests, or they might be given to invoke the blessings of the spirits upon all new dwellings.

A few of the Southwestern tribes like the Pimas and Maricopas have almost wholly discontinued their dances. Fortunately, though, it is among the tribes where the ceremonies have been of the highest type that we find these fascinating observances continued.

As has been mentioned, most of the peoples of the Rio Grande pueblos are now Catholics. Here the priests often connect the original occasion for the dance with the natal day of some saint of the church.

For the benefit of visitors to the Southwest it may not be amiss to mention a few of the more important ceremonies of the Pueblans. There are the famous nine-day snake and flute ceremonies of the Hopis, held usually in the latter part of August. During the last day of the snake ceremony, as

Photograph by Gen. H. F. Robinson

TABLITA DANCE, SAN ILDEFONSO INDIANS—Showing drummer and chorus.

THE GREEN-CORN DANCE—SANTO DOMINGO. *Photograph by Gen. H. F. Robinson*

is well known, priests of the Snake Clan dance with live snakes, including rattlers, dangling from their teeth.

On August 4th is held the corn dance at Santo Domingo, noted among other things for the large number of Indians who participate. San Felipe has a corn dance May first. The Shalako ceremonies, held at Zuñi soon after our Thanksgiving day, are elaborate and colorful. They last a day, a night and part of the day following. In January there may be seen at this same pueblo the dance of the sword "swallowers." San Juan has a dance on June 24th in honor of its patron saint. Sandia honors its special saint, St. Anthony, with a dance on June 13th. Deer, antelope and buffalo dances are held in various pueblos in January and February.

In fact there is almost no month in the year when there is not held a celebration of some kind in some pueblo. These all occupy important parts both in the religious and social life of these people. Indians from other villages as well as white visitors attend them.

Of the camp-dwelling Indians of the Southwest, the Navajos have far the most elaborate ceremonies. Some of these ceremonies, especially those held in connection with the sand paintings made by their medicine men, have excited the interest of ethnologists in all parts of the world.

The "paintings," drawn upon the ground, are often as large as ten by twelve feet. Against a background of sand or earth, dry powdered pigments are used to outline conventional representations of gods, mountains, the heavens, animals, birds and plants. Real beauty involving imagery of a high order is often seen in these works of art. The ceremony in which they are used lasts for nine days and is

HOPI SNAKE DANCERS. *Photograph from Putnam Studios*

Photograph by Gen. H. F. Robinson

ASPERGER WITH DISH AND ASPERGIL sprinkling holy water at the top of the kiva of antelope priests, Walpi, Hopiland.

given to cure the sick. The painting, according to rigid tradition, must be destroyed at the close of the ceremony.

Tribal moralities, such as be good to your friends and bad to your enemies; don't row with your mother-in-law; don't steal from members of your own tribe; refrain from black magic and witchcraft, were taught by parents, and were perhaps a part of the instruction given to young boys by the older ones in the kivas or at camp fires. But such ethical instruction was not considered as something necessarily pertaining to religion.

CHRISTIANIZATION

Slowly, but with steady progression, the Indians of the Southwest are being Christianized. This proselytization naturally is deplored by some of the Apostles of the Picturesque who, in all things, would have the red man kept as he was, and who insist that his ancient faith was better suited to his needs than the white man's belief.

Although the Indian's religion had undeniably excellent features, one great trouble with it was that it had little to do with ethics. The Indian had his morals, but usually kept them in separate compartments from his devotional activities.

Those familiar with the history of the Southwest well know that the earliest efforts toward the evangelization of the natives were made by zealous priests who accompanied the Spanish conquistadores on their *entradas* in the sixteenth century. They encountered many bitter discouragements, and a large number suffered martyrdom. In 1680 the pueblo Indians revolted, killed all the priests except a few

Photograph by Gen. H. F. Robinson

AT THE ANTELOPE KIVA, WALPI, HOPILAND.

who escaped by flight; then, washing themselves in the streams to purify themselves from the white man's baptism, reverted to the religion of the kiva.

However, priests and colonists alike, though driven out, returned, and by the nineteenth century all of the Pueblans living in the Rio Grande drainage were at least nominally Catholics, as were most of the Papagos of Arizona.

Two groups of the pueblo people only, the Zuñis, of western New Mexico, and the Hopis of northern Arizona, still largely follow their ancient beliefs, though missionaries of various denominations are now making some headway even with them.

The multiplicity of divergent faiths represented by the missionaries never fails to astonish the investigator. Their numbers include Catholics, Presbyterians, Baptists, Episcopalians, Reformed Lutheran, Seventh Day Adventists, Pentecostal Brethren and Mormons.

Some of these sects work in entire harmony with each other; others are more or less openly hostile. This is confusing to the Indian. A Pima young man once said to me: "You white men want us to adopt your religion, yet you cannot agree among yourselves which the right religion is."

Naturally, too, there is a great difference in the personality of the missionaries. Some of them are men and women of but little education and with vision narrowed by their isolation. It is among these that one is apt to find workers who seem to strive for numerical strength in their own particular churches rather than to work for the spiritual advancement of the tribe in general. Also these well-intentioned people are apt to lay more stress upon inhibitions than

Photograph by Gen. H. F. Robinson

ANTELOPE PRIESTS AT BEGINNING OF THE SNAKE CEREMONY, HOPILAND.

upon character-building activities; in other words, they seem to think the "dont's" are more important than the "do's."

Again let me quote an Indian critic, for these red men are startlingly keen in their judgments. "I think Mr. Ebberty," (naturally I do not use the missionary's real name), "has taboos almost as queer as those our old medicine men used to have. He says I mustn't take part in old Indian dances, or sing old medicine songs; I mustn't ride in pony races or play cards, and if I play ball on Sunday afternoon maybe I go to hell; though Rev. Mr. Hooperman says it is playing ball on Saturday that is so bad. Just like our old medicine man used to say I must not eat spotted fish, or kill bear unless I first say nice things about him, or if I step on horned toad maybe I get hunchback."

One hears it said of certain other missionaries, though excellent folk in many ways, that they impair their usefulness by taking an intriguing part in reservation politics and especially by trying to interfere with things pertaining solely to the Superintendent's office.

One is glad to say, however, that these criticisms describe conditions that were much more common a decade ago than to-day, and it is gratifying to learn that an ever-increasing number of missionaries among the Indians are men and women of intelligence, culture and education as well as of high character who, both by example and precept, are lifting the red men spiritually and morally, coöperating in a disinterested way for the good of the tribe with which they work.

The Apaches and Navajos have been especially slow in responding to Christianizing efforts, but even among these conservative tribes, where the native medicine man still re-

Photograph by Gen. H. F. Robinson

SNAKE DANCE, HOPILAND—Some of the snake priests are mere boys.

tains great influence, the missionaries report encouraging progress.

The most completely Christianized tribe in Arizona is the Pima, members of which, after receiving instruction in bible schools, are themselves going out as Christian teachers to other tribes, and doing excellent work.

CHAPTER XVI

GRAPHIC ART

THAT many Indians of the Southwest have an instinctive appreciation of æsthetic value in form and color is notably attested by many of the works of their hands. This artistic feeling is shown in the graceful shapes and the decorations of their pottery and baskets, in the patterns woven into such fabrics as belts, robes and blankets, in the sand paintings of the Navajos and, with such tribes as the Pueblans, in many of their ceremonial dresses and the staging of their pageants.

These artistic tendencies, as we know, run far back into the past. The esoteric symbols and figures of animals we find etched in rock or drawn with ochres on the walls of caves preserve for us expressions of artistic impulses executed perhaps more than a millennium ago. While these outlines are not of high order, they serve to tell us that the distant ancestors of modern tribes were in the habit of making pictures of animals and humans and, as well, of reducing ideas and thoughts into symbols and endeavoring to give those symbols pleasing outlines.

Far better indications of the artistic talents of the ancients is seen in the pottery forms and decorations done in such locations as the Mimbres and the Little Colorado country, and in the carvings in shell and the turquoise mosaics of Casa Grande, Pueblo Bonito and other cities.

Coming down to the Indian of to-day: When, in 1887, I was camping near a Pima village on the Gila, a frequent visitor to my tent was a Pima young man. He talked no language but his own, a tattooed zigzag line ran across his forehead, and his abundant black hair hung to his waist. The only thing his scant contact with whites had done for him was to supply him with overalls and a cotton shirt. He still wore sandals and probably never had had a hat on his head. However, he had a most engaging disposition and was a real artist.

Preferring wood to paper as a medium upon which to work, when I would find him a smooth piece of board and a pencil, he would spend an hour or more drawing the outline of some animal—a pony, or perhaps a coyote, crude, naturally, but there would be something about the pose that always made it very vivid.

His favorite subject was the locomotive. The Southern Pacific railroad had been built along their country not so many years before, and the "Iron Horse" had a great fascination for him. He would frequently devote a half day —or day if I would give him his dinner—to this subject, and would produce a drawing with much fidelity of detail and strikingly realistic.

Real sculpture is seen in some of the modern katchina dolls of the Hopis, whether cut from wood or moulded in clay and fired. Their painting of them afterwards, too, is artistic as well as novel. Equally admirable are the ceremonial masks made not only by members of that tribe but by Navajos, Yaquis and New Mexico Pueblans.

A specially notable phase of Southwestern Indian art is being given expression by a "school" of young Pueblan

Photograph by Gen. H. F. Robinson

A HOPI MASKED DANCE.

artists who are doing remarkable things in drawing and in water colors.

While this particular form of artistic expression may have been suggested to them by the canvases of modern white artists, they in no sense copied the white man's methods, but simply took an ambitious step forward in the development of the art of their ancestors. One of the best of these native artists is Alfonso Roybal—or to use his native name—Awa-Tsireh. He paints such things as groups of native dancers decked out in the ceremonial costumes of the corn, buffalo, eagle or deer dance; or his subject may be a pastoral group, such as a pueblo boy driving his little flock of goats.

His work has a sharpness of contour that suggests, to many, East Indian or Persian drawings. His figures of humans, while all somewhat conventionalized, are very much alive. His people are really dancing. His animals, as is apt to be the case with all primitive artists, are even better than his people. His goats prance!

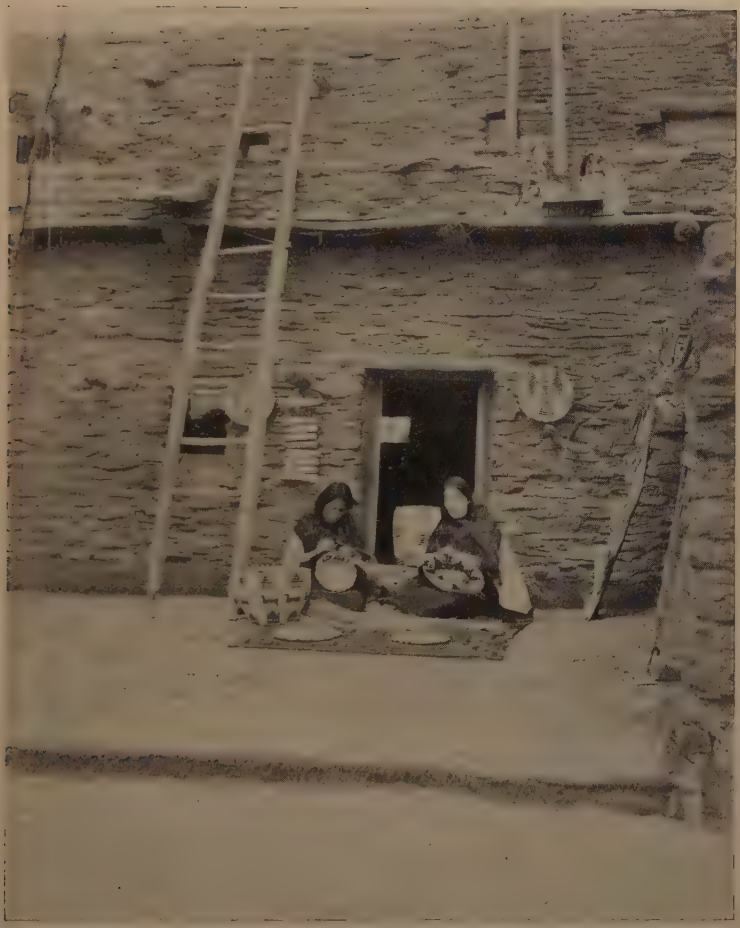
CHAPTER XVII

BASKETS

BASKETRY, which as we have seen was one of the most important of the ancient crafts of the aboriginal inhabitants of the Southwest, occupied for many years an equally important and prominent place among the post-Columbian Indians. Even yet some of these tribes make a good many baskets for their own use and for sale. Basket makers are found here to-day among the Apaches, Apache-Mohaves, Pimas, Maricopas, Hopis, Utes, Paiutes, Havasupais, Papagos, Walapais and Chemehuevis.

Experience gained through generations has taught the women of these tribes—and it is practically always the women who make the baskets—the best materials for their purpose to be found in the tribal neighborhood. These include twigs from the willow, cottonwood, aromatic sumac and mulberry trees, leaves and fibers of the yucca, fibers of the sotol and agave, roots and stalks of the tule, various grasses, martynia claws, rabbit bush, straw and willow bark.

The Indian woman takes great pains in gathering and preparing this basketry material. She harvests such twigs as the willow in the spring when the sap is running free and the buds are beginning to put forth their leaves. After she has taken the twigs to her home, with the combined use of finger nails, teeth, awl and possibly a knife, she will split each twig into three or four strips, removing the heart from



Photograph courtesy Santa Fe Railway Co.

HOPI INDIAN BASKET-WEAVERS—SECOND MESA.

the sap wood which alone is used. Her tule stalks she will gather in midsummer while green and pliable, dividing each into two strips. With the martynia, or devil's claw pods, after soaking them well, using her ever necessary awl, she will remove the outer covering of the hard, black horn of the claw and cut from it two splints.

All of such material is dried and coiled for future use. When the maker is ready to start on a basket the material that is to be flexed in weaving will be soaked well before using.

Both Havasupai and Walapai women sometimes use willow twigs without splitting them. Hopi women, too, do not split twigs used in their rough carrying-baskets.

Pima and Apache women add a whipped edge of tough martynia withes to their products, which enhances their durability.

In producing their baskets and other allied articles the makers employ various forms of weaving. The simplest is checker work, where thin, flat, flexible material, like strips from yucca leaves, is used both for warp and weft, one strip of it alternately passing over and under the other at right angles, forming a pattern of little squares like a checkerboard.

While this weave in its simplicity is almost never employed by Southwestern Indians, it is mentioned to help describe twilled work, a variation of the checker which was commonly employed by the ancients and still has its uses among these modern Indians.

The material employed is of the same nature as in checker work, but instead of the warp and weft passing over and under each other at alternate meetings, the warp will pass

over two or three strips of the weft, then under one, two or three, these variations being followed uniformly with each course, producing, according to the count, a variety of patterns.

In wickerwork, the warp is usually an inflexible material like a rod-shaped twig, while the flexible weft bends over

Photograph by Gen. H. F. Robinson

HOPI BASKET MAKER—SECOND MESA.

and under one or more of the warp rods in uniform order. This is a common form of weaving used the world over, but employed among the Indians of the Southwest only by the Hopis of the Third Mesa.

Wrapped work is where a weft material of cordlike flexibility is wrapped once around each rod of the warp as it comes to it. Sometimes a warp element is used flexible

enough so that after the weft is wrapped around it and both are pulled tight, the warp will bend with the weft and form a half knot. This can be made into a very tight, close weave.

In twined weaving the warp is made up of inflexible rods, while for the weft two flexible strands of material are used by the weaver at the same time, one passing on each side

Photograph by Will H. Robinson

Elizabeth Osef, Pima basket maker. Educated in Government Indian schools.

of the warp rod, when the weaver gives them a half turn before passing them on each side of the next warp rod. This may be varied by using three strands of the weft material, which are braided about the warp rods.

Coiling, the most nearly universal method of making baskets now followed in the Southwest, especially in the shapes most popular with white buyers, does not involve weaving at all, but is done with the aid of wrapping and

stitching. For the core or foundation of the coil the maker uses a very flexible rod, made from a section of a twig, or a collection of such rods or grasses that in the aggregate may vary in diameter from the size of a small knitting needle to as big as one's finger.

Taking this core the weaver wraps it for a short distance with a very flexible, fine, thin withe, then winding this wrapped portion upon itself, she starts her coil. As the coil grows in size she keeps attaching the new work to that already finished by engaging the completed coil with the new wrapping. Sometimes the weaver will only sew the new wrapping material through the wrapping of the old work; at other times, when the coil is composed of several twig sections or grass stems she may make her stitches deeper and engage some of that material as well.

When the plaque or basket the maker has been working on is completed, the core or foundation of the coil is not seen at all, only the wrappings, which may be in different colors, producing decorations.

I have seen Pima baskets not much larger than a thimble and plaques not over a couple of inches across, where the work is so fine that there will be as many as twenty-three coils to the inch, while the coil wrappings will number twenty-eight to the inch. As an example of large coiling, Hopi plaques and the coarser of the Pima baskets may have coils from one-third to one-half inches in diameter and with ten or twelve wrappings to the inch.

Arizona Apaches and Apache-Hohaves often use from one or two to three rods for their coil foundations, generally made of willow. The New Mexico Jicarilla Apache coils have a foundation of from three to five twigs of willow or

sumac. The Mescaleros use two rods, one placed above the other, with two or more strips of leaves to act as welting. The material wrapped about the coils is strips of narrow-leaved yucca.

Baskets were and are made in many forms by these Southwestern Indians, and put to a surprising number of uses. As they possess the great advantage over pottery of being able

Photograph by Gen. H. F. Robinson

PAIUTE WEDDING BASKET (center). Others Pima.

to endure much rough treatment without breaking, in former days they were used by the natives—especially by the nomads or camp dwellers—for many purposes one would think would be given over to earthenware vessels.

The flattened bowl or saucer-shaped basket, from a foot to two feet across, was the most popular form for household use. This was used as a mixing bowl, a food container and actually to cook in. When lined with clay, corn could be parched in it, or insects or pieces of meat grilled by placing hot coals among them and shaking the basket.

This same form of basket is used to winnow grain. The

women toss the mixed grain and chaff from the basket into the air, letting the wind blow the husks away and catching the clean grain in the basket. It is a picturesque sight to watch them.

Water bottles or canteens of basketry were rendered water tight through the closeness of their weave, or what was more common, from being coated on the inside, or both inside and

Photograph by Will H. Robinson

Paiute Wedding Basket (large saucer-shaped one), Apache Canteens. Others of Pima weave.

out with pitch or gum. Some of the tribes, like the Havasupais often made the body of these water bottles lemon-shaped—almost pointed at the bottom. Other tribes made their bottles more spherical. All had cylindrical necks four or five inches long with an opening diameter of from three to four inches. These bottles might have a capacity of from a half-pint to two or three gallons.

A fairly wide-mouthed, pot-shaped, water-tight basket was used by the Havasupais and other tribes for cooking porridge or boiling meat or vegetables, the liquid contents being

brought to boiling point by the immersion of hot stones. A tight wrap weave, twined weave, and coiled work were all employed in making these water bottles and pots. Sometimes the Havasupais and Walapais would use unsplit wil-

Photograph by Will H. Robinson

Apache baskets (largest two); Hopi (right above); Pima (left below).

lows for their water bottles, depending upon liberal use of pitch to make them water tight.

Loops of horsehair were woven into the sides of the bottles, to which straps were fastened. When the bottle was carried it was suspended at the back with a strap going about the bearer's forehead. These useful accessories for the traveler are still used.

Certain groups of Apaches still employ water bottles in the fermentation of tulapai or tiswin. Through long usage the bottles become coated on the inside with the desired brand of bacteria, which hastens the culture growth of their contents.

Burden or carrying-baskets, made in a number of forms and weaves, were used by women in the transportation of various articles, and for gathering such wild products as grass seed, cactus fruit, mesquite beans and the like. Some of these were conical in shape, rather flexible, and made with a twined weave. One form of Apache carrying-basket resembled in shape a rather large waste-paper basket. It was usually decorated with a pleasing pattern in color worked into the weaving, and with a buckskin fringe, the strands of which might be tipped with tin. Mulberry twigs, on account of their durability, were much esteemed in making these baskets.

A woven fan that suggests a small paddle or tennis racket was used by the women of the Paiutes and other tribes in gathering seed. They would take a handful of grass, hold the heads over the side of the basket and beat out the seed.

Hopis, Zuñis and Navajos used a coarse wicker-weave carrying-basket.

The mothers in all the Southwestern tribes formerly made carriers or cradles for their babies. These were usually woven of stout basketry material with an arched woven awning to protect the head. The outer edge warp rod often consisted of a sapling bent in "U" or ox-bow shape.

Some of these cradles showed much loving care. Where there were many children and the carrier was retained,

Photograph by Gen. H. F. Robinson

APACHE HOPI AND PIMA BASKETS—HOPI KATCHINA DOLL.

after number one was through with it, for the use of number two, or three, or more, it showed much wear. After little number four had reached toddling age Mother doubtless had to start in on another cradle.

As we have seen, the bodies and legs of the wee ones were tightly bound to the carrier, with head and arms free.

The Pima women formerly made a very unique sort of a burden carrier—their famous kiahas. This included a conical-

shaped net of twine held open at the top with a double hoop made of willow withes, and supported by a framework made of four ribs from the sahuaro cactus, which joined at the point of the net and at their other ends extended above and beyond the hoop for perhaps a couple of feet.

Photograph by Will H. Robinson

Apache and Pima Baskets—Hopi Katchina Doll. Model Pima carrying net and frame.

The net was made in various ornamental patterns by an interlocking stitch. The twine they manufactured from fibers of the agave, or sotol or certain varieties of yucca. The hoop was bound to the sahuaro ribs with cords made of human hair.

The kiaha rested on the shoulders and back of the carrier, where an apron of yucca matting eased the load. There

was also a supporting woven yucca band that passed across the wearer's head.

Little girls as young as eight had kiahas made especially for them, and were taught how to arrange their burdens in the net, and how to put the kiaha on their backs. They practiced carrying heavier and heavier burdens and walking increasing distances with them, until when they were grown, an eighty or ninety pound load was not considered especially heavy.

All sorts of things were carried in the kiahas—an olla or two, a load of mesquite firewood, husband's saddle and bridle, a miscellaneous assortment of articles for the camp, with perhaps the latest baby tied neatly in its carrying-case, safely tucked away in the center of the load.

The Hopis use their flat trays or plaques in many of their ceremonies. In them they place their prayer plumes or bahos which they put before their altars. They also use them to hold the sacred meal, and as the central feature of certain dances.

A saucer-shaped basket, about eighteen inches across, is made by the Paiutes and used by the Navajos in their wedding ceremonies. These and similar baskets are also used by both Navajo and Apache shamans "professionally" who esteem them highly as "good medicine." The design, patterned against a natural straw-colored background in black and red, is an indented band circling the inside. There is a narrow path through the band which represents the trail from the world people live in to the underworld of the unseen spirits.

The Hopis also make a large saucer-shaped basket having a firm hoop at the edge and a flexible center, in a twilled

weave. This they use for such purposes as carrying peaches.

Large, coarsely constructed baskets considerably larger than a barrel were formerly made by Pimas and other Indians for the storage of grains, mesquite beans and other food stuffs. They were sometimes simply made of straw, fol-

Photograph by Gen. H. F. Robinson

HOPI BASKETS—Two plaques on right and basket on lowest step from Third Mesa, others Second Mesa.

lowing the coiling method, and sewed together with strips of willow bark.

Small baskets of yucca leaves and similar material in a twilled weave were made by Pimas and others for holding a variety of small objects. The medicine men occasionally used such a basket to contain their sacred paraphernalia.

Small bowls used as drinking cups, or out of which pinole

—parched corn—was eaten, were carried by the men of some tribes when hunting or on the warpath.

Sleeping-mats were formerly made by the Pueblans and other tribes. These were put together in a twilled weave with yucca leaves. The Utes formerly wove a basket hat without brim or visor and with a peak at the top. Turned upside down, Navajos use baskets as drums in sacred ceremonies.

From a time antedating the coming of Columbus by many centuries, the natives of the Southwest have ornamented their baskets and similar products by weaving in designs in colored splints of contrasting hues. Against the white background of their baskets of willow or cottonwood, the Pimas and Arizona Apaches usually work in their designs with the natural black of the martynia pods. Red is introduced into their figures by dying white material. The coloring may be obtained from the root of the yucca, the mountain mahogany or other natural dye. The white of the willow in time mellows into a soft yellow that is most pleasing.

The body of the Papago basket, made as it is from bleached yucca leaves, is also white. To make figures in pale green or yellow they use yucca leaves unbleached or partially bleached. Hopis and New Mexico Apaches introduce a variety of colors in the patterns of their baskets by the use of aniline dyes.

In the Pima baskets most of the designs are geometrical. Some of these are now considered by both makers and collectors to be conventionalized forms of such things as flowers, stars, whirlwinds and other familiar things. A Pima basket-maker never draws a preliminary pattern to work by, and will not hesitate to modify a design as she works, if a

new idea inspires her. It is easily possible that the resemblance of designs to familiar objects was obtained originally by chance, and afterwards became accepted motifs to follow, in a general way, in future baskets.

The best known of the Pima designs go by such names as the "squash-bloom," "the shell" or "turtle-back," "the star," "the whirlwind," "butterfly wings," and "coyote tracks." A fret is also sometimes introduced resembling the classic one of the Greeks. They also use a variation of the swastica, but apply no esoteric meaning to it.

Figures of animals, humans and desert plants worked into designs are popular with buyers, so nowadays we see easily recognized figures of men and women, horses, Gila monsters, chaparral cocks, giant cacti, and ocatilla clumps. A spider-web, with the spider and fly both shown, is an interesting design. Even more intriguing is a copy of the Cretan maze reproduced from a design found scratched, no one knows how long ago, on the walls of the ancient Casa Grande ruin. In basketry this design is worked into a plaque with the figure of a man at the entrance to the maze.

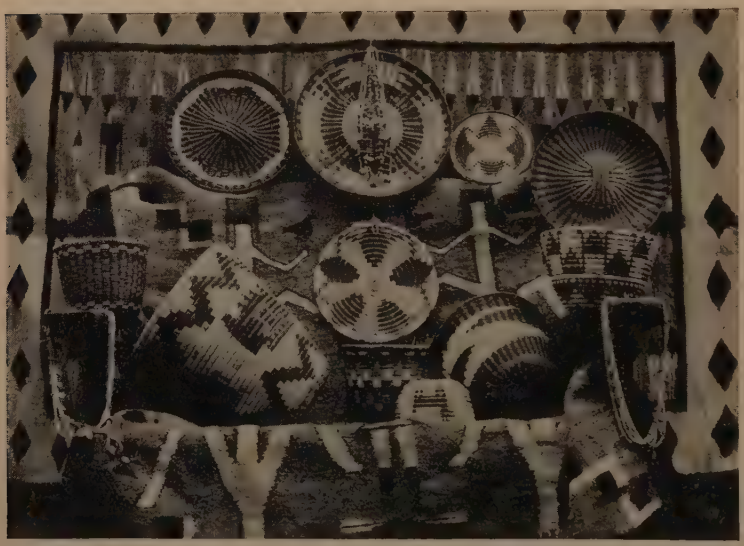
Apaches also work out very beautiful geometrical designs. Even earlier than did the Pimas they began to put figures of animals, humans and plants on their baskets. Both tribes do very fine work, their baskets lasting for a score of years or more.

Hopi decorated work from the Second Mesa is made in the form of thick plaques and bowls, with large, fat coils. On the Third Mesa the basketry is all wicker work. On both of these mesas the figures on their baskets, like those the Hopis of the First Mesa use on their pottery, are traditional and highly conventionalized. There may be an eagle—the

thunder-bird—a human face, clouds, the crescent moon, spider web—all sorts of things.

Ornamenting baskets by fastening feathers into them is not done by Southwestern natives.

Indian baskets made for the market here are, for the most



Photograph by Will H. Robinson

HOPI BASKETS FROM SECOND AND THIRD MESAS.

part, of coiled ware. The most popular form is the urn or olla shape, which may be anywhere from six inches to three or four feet tall. Buyers find them useful for a great variety of purposes about a house—from umbrella stands to waste-paper baskets.

The Pimas and Papagos, especially, make a good many well-made small baskets, both with and without tops, which

are used for trinket and sewing baskets. They also make pin and dresser trays.

The handsome Hopi plaques sell readily for wall ornaments. The thick bowls in coiled ware made in Hopiland, in their variegated colors, also find ready customers.

I am writing this chapter in Chandler, Arizona. There are two "curio" stores in the town, both conducted by women who buy baskets from the Indians. Pima women come in from the Gila reservation thirty-two miles away, and from the Salt, twenty miles. Apache-Mohave women journey down from the Verde, thirty-six miles, and occasionally a San Carlos Apache, whose brave may be at work with a canal construction gang here in the "Valley," also brings in a basket. Oftener than not they journey in a flivver owned by the family or a neighbor.

The returned young women students among the Pimas especially interest me, both from the fact that they are not letting the ancient craft die out and also from their notable personalities. They are gentlewomen. I use the word thoughtfully. They have good manners and low, gentle voices; they are cleanly and are becomingly clad and neatly shod.

A Pima woman comes into one of the stores quietly, unties her basket from the cloth in which she will always have it wrapped, and states a price. The dealer examines the basket critically. The two talk frankly about its merits and faults, the dealer doing most of the talking, but the maker having her say, too. The transaction, if the basket is a superior one, may take some time, but there is no real haggling. Prices paid may be all the way from fifty cents for a small, poorly made piece to fifty or seventy-five dollars for

a basket if it is large and fine enough. Sometimes the old Pima grandmothers come in with the young educated girls. They have dignity, too, and good manners—if their dresses are not so neat as those of the younger women.

The dress of the Papago women has more of a gypsy look. They may wear a scarf of green about their heads, and their English is apt to be decidedly sketchy. Their yucca-leaf baskets are easily made, and, although they look well, are less durable than the Pima work and bring a much lower price.

The Apache women always seem to have a touch of the wild about them. I do not mean anything connected with savagery, but they act just a bit ill at ease in the store as though in some way it suggested a trap to them, and they would like to be out in the open again.

Their work, though, is admirable. They are artists in their craftsmanship. And they never under-value their baskets, pricing them at all the market will stand. They think nothing of asking seventy-five dollars for an extra large and extra well made basket. If the price seems high, one must remember that they spend much of their time for months on one of these "super-productions"—to borrow a term from the motion pictures.

All of these tribes-women spend their money wisely. No squandering of dollars here as among the Osage oil magnates of Oklahoma. They know the value of their money in terms of work as well as in what it will buy. Basket money goes into shoes and sugar, dress goods and coffee. And for a mild little spree, which surely thay have earned, Pima school graduates, ancient grandmas, Papagos or Apaches, all usually wander down the street and slip into Gardner's or Webber's

drug store and have a nice cool dish of pink ice cream with chocolate syrup a-top it.

From what I have written it will be seen that the art of basketry is still very much alive in this section of the Southwest and the quality of the work is not deteriorating. The local dealers are in a large measure responsible for this. Every time a woman brings in a basket they impress the fact upon her that while a good basket will bring a high price, poor ones are worth little or nothing.

As with designs in the Navajo blankets and the figures on Indian pottery, the question is often asked me as to whether there is a mystic or hidden meaning in the figures woven into Indian baskets. It is wholly likely that there is a certain symbolism in the trays of the Hopis used before their altars or in other sacred ceremonies. Manifestly there is also a symbolic meaning in the pattern on the medicine basket of the Paiutes.

With the modern baskets of such tribes as the Apaches and Pimas, I believe the impulse inspiring the maker is artistic rather than mystic. What she strives to do is to produce a basket of good form and pleasing design that will not only be worthy of her craftsmanship and enhance her reputation among her people, but will please the dealer to whom she sells her wares, and bring her a good price. The best of these gentle craftswomen make as good baskets today for sale as did their mothers for household use.

CHAPTER XVIII

CERAMICS

WHILE the bulk of the pottery made by the Indians of the Southwest is of the ornamental variety manufactured to sell to "tourists" as souvenirs, not an inconsiderable amount is fashioned for their own household uses—food containers, cooking utensils and especially water jars. These *ollas,* as they are usually called, are hung in the shade of their porches or *ramadas* where a breeze will strike them. Here the slow percolation of the moisture through the porous sides, evaporating in the dry air, keeps the water at a palatable temperature even when the thermometer registers one hundred or more. The efficacy of the olla as a refrigerant is increased by wrapping it on the outside with several thicknesses of burlap or other cloth and keeping it wet.

Not all tribes or villages have their pottery makers; the women, however, who do still follow the art use the same methods as did their grandmothers a thousand years ago. They have their favorite clay deposit; sifting their material if necessary to remove foreign or coarse substances, adding a little dust pulverized from broken pieces of pottery to temper it, and mixing it all with water to a puttylike consistency. A basket of the proper shape or a section of gourd is used for a mould for the bottom, into which a lump of clay is pressed

Photograph from Putnam Studios

PUEBLAN WOMAN DECORATING POTTERY.

for a starting point, then pulling more of the clay into a long strip like an old-fashioned stick of candy, the maker coils it around and around upon itself, carefully pressing her work into shape inside and out with the help of a little paddle, continually patting with it and always keeping a dish of water handy that her clay may not become too dry. After the vessel is finished it is placed in the sun and, when thoroughly dried, polished with a smooth stone. It is then treated with a wash made of fine clay. Pimas, Papagos and Maricopas use a reddish ochre; many of the Rio Grande Pueblans use a whitish slip or add a little red to give a pinkish cast.

A few of the Pima women now fire the vessel, as soon as the wash or slip is put on, then, with the aid of a stick or bunch of fiber, paint on it their decorations and fire it again. In the Rio Grande pueblos the pottery is ornamented and then fired but once. At Santa Clara the fire is smudged after unornamented pieces are partially burned, which turns them black, after which they are given a high polish.

The ware found in the different communities will vary somewhat not only as to color and decorations but in certain of the forms. The usual shapes made by most of the potters include cups, bowls, trays and vases. In a few of the villages animal heads or the entire body will be incorporated into a vessel to form a handle, or a beast or butterfly, or whatever it may be, will be modeled into the sides or the bottom, or the neck of a vase may take the form of a human bust or head. Certain potters make dolls, or doll heads or figurines of humans or beasts.

The designs the women paint upon their vessels include geometric figures, flowers, birds, beasts and occasionally

Photograph courtesy Santa Fe Railway Co.

PUEBLO INDIAN WOMAN MAKING POTTERY—Scene on "Indian Detour" near Santa Fe, N. M.

humans. Some of these are very much conventionalized, others painted with a more or less successful attempt at realism. To make such an animal as a deer or antelope quite complete sometimes an artist of certain villages will indicate in her drawing an internal organ or two. Even patterns which appear to be purely geometric may be conventional representations of such things as a cloud or rain, a mountain or a prayer plume, the tail feathers of a bird or the path of lightning.

The usual ware of the Pimas, Maricopas, Yumas and Mohave Indians has its red background decorated with lines or simple geometric figures in black. Lena Mesquerre, the outstanding ceramic artist of the Pimas, varies the usual red surface of her wares by introducing contrasting areas of light gray, then adding simple, well executed geometric figures in black. Her pieces are fairly thin, well fired and highly polished.

Hopi pottery—and it is made only on the First Mesa where Tewa women are also makers—has always taken high rank in the ceramics of the Southwest. The pieces are not only graceful in form, but achieve a special distinction by their color and the unique pattern of their decorations. Owing to peculiarities in the clay used, which is found in a certain stratum of their cliffs, when burned not too deeply it produces a ware of light cream; if fired longer it becomes a delicate buff with patches of apricot. The patterns used in the decorations, done in black or black and red, are peculiarly their own, being developed from designs originated by their ancestors back in cliff-dwelling days.

Still, beautiful as the best of this modern ware is, it does not equal the superlative loveliness of polychrome pieces that

have been found in the ruins of the ancient cities of their forebears.

For over a decade the finest pottery of Hopiland was made by Nampeyo, the Tewa. Following the classical forms and decorations of ceramics excavated from the ruins of ancient Sityatki, she raised the standard of her art among the mesa people to a higher level than it has known in generations. Pieces of her beautiful ware grace the collections of connoisseurs the world over.

She is now old and blind. While her daughters have inherited much of her artistry, a neighbor on the First Mesa, Paqua (The Frog) is to-day considered the best potter of the Hopi villages.

Zuñi women still make excellent pottery in considerable quantity. The body color of their ware is white upon which are applied designs in black, brown and red. It is here we find such figures as butterflies and frogs attached to certain portions of their bowls and painted with considerable artistry.

Acoma women have long been famous for the superior quality of their ceramics. Not only are their forms good and their decorations gracefully applied, but the ware is exceptionally thin and well fired. Its sonorous ring when hit is in marked contrast to the dull note given out by softer fired pottery found in some of the other villages.

San Juan also makes a small amount of black ware, like that of Santa Clara.

At Cochiti and Tesuqui, and a few other villages, vessels simulating animal forms are made. Cochiti potters also make a large urn with interesting floral decorations.

In San Ildefonso lives Maria Martinez, who fashions her

urns and bowls with such art that she has lifted her products into a class by themselves. Some of her pieces are in solid red, others in black, with her designs worked out by using contrasting areas of dull and polished surfaces. Her pieces are always graceful in form, admirable in design, thin and well fired, and altogether stamped with a brilliance of

Photograph by Gen. H. F. Robinson

A HOPI POTTER.

artistry that commands one's highest admiration. A few other Pueblan potters are following her style, with steadily increasing success.

It will not be difficult for you if you are traveling in the Southwest to acquire Indian pottery. In the curio dealers' windows in every town you will see the quaint, barbaric pieces. If you visit the reservations the trader will have them on his shelves. Even if you but pass through the En-

chanted Land on one of the transcontinental railroads, when the train stops at such a native village as Laguna, Indian women will bring trays of their wares to your window.

Or perhaps you are motoring—say between Albuquerque and Sante Fe. At the crests of the hills where one is apt to slow down on account of the grade there will be found a little group of native men as well as women pottery venders, the men with the usual white man's dress only slightly modified, but the women, with their added bits of color in the way of a bright silk scarf and a picturesque arrangement of the dress, looking quite like what one would want a Pueblan lady to be.

The women not only look more picturesque than the men, but they are better at the selling game. The men may make no greater effort to attract the traveler's attention than an upraised hand. Not so the girls or women. Very much "on the job," with their most enticing pieces held out toward you at arm's length, their faces light up most expectantly as you approach, as though they really believed you would stop and buy. So, often, you do, although you haven't the slightest idea what you will do with the *objets d'art* after you get them. It's such fun to see their pleasure over the transaction.

CHAPTER XIX

BLANKETS

UST how early in their history the Navajo Indians began making their famous blankets is unknown. It was the common belief among their early white neighbors that they first learned the art of weaving from women stolen from the Pueblans. Subsequent study by ethnologists shows some evidence that the Navajos had a primitive art of weaving of their own, which, however, was vastly improved by their contact with the village people. It may also be believed that the infusion of Pueblan blood into the tribe could scarcely help adding to their artistic traits. It is of interest to note that while with the pueblo tribes it was the men who did the weaving, with the lordly Navajos it was an exceptional man who would bother with so gentle an art as that embraced in the textiles. They turned the job over to the women.

Before the Spaniards came the materials used by the Southwestern tribes in weaving included, as we have already learned, strips of rabbit and other skin and native cotton. Yucca fiber was utilized in making sandals and mats. Wool, of course, was not used in blanket-making until after the introduction of domestic sheep by the Spaniards, though the fleece of a slain mountain sheep may have occasionally found its way into woven products in prehistoric times.

The first flocks probably came into their possession as loot. Once obtained they rapidly increased and the pastoral life of the herdsman fitted the nomadic taste of the Navajos perfectly, though here again the lords of the hogans, especially busy in those days with hunting and raiding, left much of the immediate work of caring for the flocks to the women and children.

The public usually thinks of the products of the looms of the Southwestern Indians only in terms of blankets, but it should be remembered that blankets were only one of a number of articles manufactured. There were woven, besides, dresses for the women, dance aprons, headbands, hair and legging-ties, girdles, saddle blankets and cinches.

The workmanship, patterns and coloring of these articles have always commanded admiration. When, back in the early part of the nineteenth century, they were first seen by trappers and hunters from the Eastern states it was naturally considered a great marvel that "savages" living in squalid surroundings could produce products so admirable.

In many early accounts of these blankets they were called Navajo *sarapes* and the fact was always commented upon that they were so closely woven they could hold water.

When the Southwest was still a part of Mexico the Navajos made two distinct varieties of blankets, those from the wool of their native sheep and the famous *bayeta* blanket. "Bayeta" is the Spanish word for baize. The Mexican colonists brought into the Rio Grande country an exceptionally fine baize, coming in a number of colors, which they traded to the natives. The beautiful coloring, together with the smoothness of the yarn, so appealed to the Navajo women that they raveled the cloth and retwisting the fine woolen

strands, wove them into products that ever since have been the wonder and delight of the connoisseur.

In making these blankets the warp, as well as the woof, was of wool. The yarn being so fine, the finished fabric was very smooth and much lighter than the usual weave from native fleeces, though the tight weaving made them rather stiff.

Many of the blankets were woven in the form of a poncho with a short slit in the center running lengthwise, through which the wearer could thrust his head, letting the blanket hang like a cape.

A Doctor Letherman writing of the Navajos as they were living in 1854, thus speaks of the costumes of the men.

"Some wear short breeches of brownish-colored buckskin or red baize, buttoned at the knees, and leggings of the same material. A small blanket, or piece of red baize, with a hole in it, through which the head is thrust, extends a short distance below the small of the back, and covers the abdomen in front, the sides being partially sewed together; and a strip of red cloth attached to the blanket or baize, where it covers the shoulder, forms the sleeve, the whole serving the purpose of a coat. Over all this is thrown a blanket, under and sometimes over which is worn a belt, to which are attached oval pieces of silver, plain or variously wrought."

Dresses for the women were also woven from bayeta yarn, being simply oblong blankets tacked together at the sides.

All of the bayetas now in existence are seventy-five years old or over and are in the possession of private collectors or in museums. For the most part they are exquisite things, wonderful in workmanship, design and color. In them one finds the simple but artistic designs worked out in red,

NAVAJO WOMAN WEAVING BLANKET.

Photograph by Gen. H. F. Robinson

white, blue, and black with occasional touches of brownish-yellow and even a gold-green. In many cases the original red, which was the color most prominently used, has been toned down by the softening hand of Time to rose, the white transformed to a delicate cream and the blue mellowed to a turquoise.

The patterns include stripes, diamonds, and zigzags combined in an infinite number of designs, sometimes relieved by tiny squares or small crosses with arms of equal length. With all Navajo blankets the usual rule is for the stripes, which dominate the pattern, to run across the short way of the cloth, but in what are called chiefs' blankets the stripes extend the long way. These formerly were worn by head men of the tribe, who evidently wanted their apparel to distinguish them from the commoners.

While the blankets which the Navajos were making from native wool were, as we have seen, heavier and coarser than the bayetas, most of them, also, were wholly admirable. Naturally, workmanship would vary among the different weavers but, on the whole, it was usually of a high order. Many of the blankets and garments made for ceremonials were expected to last a lifetime.

Usually the women washed the wool thoroughly, carded it with care and spun the yarn strong and fine, using a simple spindle, consisting of a thinly diametered stick passing through a wooden disk.

The usual colors in these native yarn blankets were white, black, gray, red and blue, and rather often they would make sparing use of yellow and even green. White and black they could obtain in natural colors as the wool came from the sheep. A mixture of the two made gray, though some

Photograph by Will H. Robinson

NAVAJO LOOM AND BLANKET, HOPI BASKETS, PUEBLAN DRUM.

of their sheep produced a grayish wool and, more rarely, a brown. The natural black wool had a touch of red in it, so it was usually dipped in black dye. The blue was made with indigo obtained from the Spaniards. The rest of their dyes they made from local vegetable growths or minerals.

In the seventies of the nineteenth century traders brought in Germantown, zephyr, Saxony and other yarns which they sold to the Navajo weavers. In using these machine-made yarns the best of the weavers made very good blankets and other articles, using the old dyes and woolen warp. Other products made by inferior weavers were considerably below earlier standards.

The real decline in the quality of Navajo blankets, however, came about ten years later and was occasioned by the short-sighted policy adopted by certain Indian traders.

This was the time when they first realized that the Navajo blanket was something for which the white man was ready to pay a good price. A Navajo blanket was not only a souvenir of the country but it was new and unique. Its bright colors with their suggestion of the barbaric were wholly intriguing, and it had distinct utility as well as beauty.

Here it may be said that few if any of the blankets of the Navajos made at any period have a pliability, lightness or softness that adapts them to the purposes to which we usually put a blanket, and it is interesting to note that the Navajo recognizes the qualities in which our blankets excel quite as much as we appreciate the good qualities of his, so nowadays while he sells us blankets to use for couch covers, portieres and rugs, he buys our factory-made blanket to wrap around him, or for his bed. Incidentally it may be added that it is

a profitable exchange as he receives enough for one of his blankets to pay for four or five of ours.

At the time the traders found that they had a market for the Indian blankets right at their doors the Navajo women were only making a few more blankets than could be consumed in their own tribe, and at best the traders could obtain a few hundred pounds of blankets a year.

Whereupon, to encourage the women to turn out more work the traders brought in cotton warp all ready for their looms, and, as well, aniline dyes to be used in place of the former homemade vegetable dyes. These were pernicious influences. The cotton warp lacked both the flexibility and strength of the wool. Where the old woolen-warp rugs would wear for a decade or more, the cotton warp, when the new products were subjected to at all hard usage, would break, and the rug would be ruined.

As for the aniline dyes introduced, not only would many of the colors fade, but they included shades that were atrocious, and with so many hues to choose from the weavers became quite color mad and produced blankets that were prismatic nightmares.

In other ways, too, the craft suffered demoralization. If haste was what was wanted, reasoned the weaver, why should she not reduce to a minimum her labors in washing, carding and spinning. In consequence, the yarn was loosely and unevenly spun, burrs and other foreign substances were left in, and with the wool only half washed the dyes did not set properly. Altogether, blankets were produced that were a disgrace alike to the maker, the trader and the ultimate purchaser who put them on his floors.

For a time the undiscerning tenderfoot continued to buy

these abominations, but finally realizing the stuff was quite worthless, he quit.

The traders then had a great awakening. Most of them by this time were heartily sick of the whole business.

Photograph by Will H. Robinson

Apache gathering and carrying baskets, Navajo corn blanket.

Indeed, a few had never encouraged the cheapening of the product in the first place.

However, some of the traders still would buy poor blankets if they could get them cheap enough and there

were slovenly and inexpert weavers who would still make them.

Various plans were tried by the better traders to remedy the pernicious influences that had been started. One trader shipped native wool away, had it cleaned at a factory and reshipped to the reservation. Most of the traders removed all but the best of the aniline dyes from their stocks, leaving only desirable colors. Higher prices were offered for superior blankets, and to stimulate competition prizes were given for the best blankets by traders and at fairs.

As a result of all this a reaction was produced that with the best weavers amounted to a renaissance. So to-day, while there are still poor blankets on the market, there are many that are admirable in every way; and if it is difficult to get all of the weavers in this commercial age to take the pains their mothers did with the old ceremonial weaves, there are still Navajo women not only as skillful as any who ever sat before one of their primitive looms, but who have the true craftsman spirit, and will not willingly turn out anything unworthy.

And now that we have learned something of the history of the Navajo blankets, it might be interesting to see just how they are made.

The wool after it comes from the shearers is washed in large bowls, the root of the amole—the Spanish bayonet—being used in place of soap. After being macerated, when mixed with water the root makes a wonderful suds and cleans the wool beautifully. The washing finished, the wool is dried in the sun, dyed and then put through a fixing bath.

Most of the weaving is done in summer when the work

can be executed out of doors, and, while the looms look crude, they are admirably adapted for their purpose.

A well-made loom may have two upright posts somewhat higher than the weaver's head, firmly set in the ground and far enough apart to accommodate the blanket's width. These posts are connected at the top by a cross pole held in place by lashings of rawhide. Hanging from this by loose coils of rawhide or rope is a second cross beam which need not be larger than a stout cane. Suspended from this by loops is a third crosspiece which is the true upper beam of the loom to which the warp is fastened. The strings constituting the warp drop down to a lower cross bar, which clears the ground two or three inches. And that's the loom! Sometimes it is even simpler than this, where conveniently placed trees are used instead of the upright poles.

As she works, the weaver nearly always sits on the ground. A light cross stick called the heald-rod, at convenient height is tied to alternate strings of the warp and this with another cross rod above is arranged, with the supplementary use of a "batter" stick, to permit the weaver to separate the alternate strings so she may pass the little ball of yarn through which she uses for a shuttle. This "batter" stick, that may be likened to an exaggerated paper knife, is of wood about three inches in width and one and one-half or two feet long.

If she is making a stripe to extend clear across the blanket, the little ball of yarn, of course, is pushed through the entire distance. But if she is working out a pattern, she has as many little balls of yarn as there are colors in the line, and stops with one ball and begins with another whenever the color changes. Or she may carry up the pattern in one color above the rest of the line for several courses and fill

Photograph courtesy Santa Fe Railway Co.

NAVAJO BLANKET WEAVER, AND SILVERSMITH.

in with another afterwards. As it is single ply, the pattern is of course the same color on both sides.

After each line of woof is put through it is brushed down into place with a fiber or wooden reed-fork or comb and then driven down hard by the batten. The thoroughness with which this battening is done is responsible for the tightness of the weave and the durability of the blanket.

Girdles, cinches, and other narrow fabrics, are woven on differently arranged but even simpler looms, the weaving here usually being done so the warp comes to the surface, and the woof is concealed, with the pattern showing in different colors on the opposite sides.

A few large blankets have been made two-ply, but they are very rare.

When making a blanket a Navajo woman rarely if ever marks her pattern down before starting to weave, but carries the whole design in her head.

It has long been a matter of controversy as to how much symbolism, if any, a weaver puts into her blanket. The idealists maintain that every line and every color in a blanket has a symbolic meaning; the materialist says there is no symbolic meaning at all.

Those who know the Navajos best will tell you that while for the most part the weaver is thinking of pattern and color as artistic mediums rather than anything esoteric, nevertheless, with many of the women symbolism undoubtedly plays a part.

We have already seen that in the sand paintings of the medicine men there is mysticism in every line and shade. We know, too, that there is a symbol in certain basket patterns and pottery decorations. It would be strange indeed

if these artistic Navajo women, who see mysticism in almost every phenomenon of nature, working with a medium as expressive as weaving, could help putting into their products some symbolic expression. However, it is easy to become extravagant, even fantastic in speculating on what the worker had in mind.

The zigzags are lightning, and, as the home-loving Navajo always gives his god, or godlike element, a wife, the masculine lightning the weaver terminates with a point, the feminine with a blunt end. The cross indicates the four points of the compass; it also brings good luck. The sun, moon and stars may be indicated in points of color, and the pyramid may be a path of life, both for mankind and the gods.

White is believed to represent innocence and purity; black sorrow, sometimes command.. Red, which the Navajos consider the color of sunshine, shows strength and joy; blue, truth and loyalty.

In 1915 a daring innovation in blanket patterns was introduced by a Navajo woman. She conceived the stupendous idea of utilizing figures from the medicine men's sacred sand paintings, and what is more, she carried it out.

To appreciate just what this meant it must be remembered that only a medicine man might make a sand painting, and that it must be made and destroyed in a single day. For a woman to put the figures into a blanket was sacrilege.

When the blanket was finished, sold and hung upon the walls of the trader who bought it, and the medicine men saw it, naturally there was great excitement. They insisted that the trader must give it to them. He declined. They tried to buy it; they tried to steal it; they tried to make the trader agree not to sell it; but that gentleman, wise in his

business, knew what a demand there would be for these unique fabrics if he could get the women to make them in quantities.

He sold the blanket at a good price and offered its weaver a most attractive remuneration for another. The weaver

Photograph by Will H. Robinson

NAVAJO "YEIBITSAI" BLANKET.

and her family as well, seeing that no dire calamity, such as had been prophesied by the shamans of the tribe, had followed the making and selling of the first blanket, decided, in view of the money there was in it, to take a chance on tempting the gods another time. So a second blanket was made, and a third.

Other weavers looked on and, pondering, decided they would like a little of the extra profits that went with using sand painting designs. Now, these blankets are a regular

line of the traders' stocks, and still sell for higher prices than the usual patterns. They are usually designated "Yeibitsai" blankets. "Yeibitsai," the Navajos say, means, "Grandfather of the gods." This name is also applied to the public part of the "Night Chant," a dance ending a nine-day Navajo ceremony.

To summarize, if one wishes to purchase a superior blanket the following are some of the things to keep in mind. The yarn of the warp as well as the woof should be of wool and free from dirt and other foreign matter. The woof should be of fine quality, fairly soft to the touch but not fuzzy, and tightly twisted. The warp should be large enough to insure strength.

Blankets made of native wool naturally are coarser than if of Germantown, but this, of course, does not detract from their value, only one should be sure that the warp is of strongly twisted wool, and that color and pattern are good.

Designs should maintain Navajo characteristics and not show an intrusion of ideas wholly alien to an Indian product. Such things as representations of trains, lard pails and English letters, while sometimes amusing, are an abomination. Let the other fellow buy the blankets that include them.

As we have already indicated, stripes, diamonds, pyramids, zigzags, little rectangles and crosses are all original Indian conceptions and are used by good weavers with an infinite number of pleasing variations.

In deciding upon a color scheme naturally one is influenced by the use to which he plans to put the blanket. For example, blue and white or blue, gray and white would find a place where more violent colors would be wholly out of

Photograph from Putnam Studios

HOPI BLANKET WEAVER—With the Hopis, the men do the weaving; with the Navajos, the women.

key, while in a masculine den or a dark corner of a hall that needed livening, red and white, red, black and white, or even more striking combinations might give just the dash of color needed.

But, save in exceptional cases, let the combination not include too many colors. And what was said about patterns applies equally to colors—have them characteristically Indian. Red, blue, white, gray and black are all true Navajo colors. Some of the Navajo sheep have brown wool, and its use in blankets is wholly legitimate providing it is combined with harmonious shades.

The Yeibitsai blankets are rather a law to themselves, only a person would take more comfort in owning one if he knew the symbols were true to tradition.

Above all things, never buy a blanket regardless of quality, just because it was made by an Indian. An exceptional blanket may be bold and daring, but such a one should show native genius and not be meaningless jazz.

While many informative hints about blankets may be written, it takes more than reading to make one a connoisseur. So avoid the irresponsible dealer. There are plenty in the Southwest who know what is good in blankets and may be trusted. In buying a Yeibitsai, it is obvious one must take the dealer's word as to its symbolism.

CHAPTER XX

MUSIC

MANY critics, having only a casual knowledge of Indians, believe that their music is something scarcely deserving the name, and insist that for the most part it consists of unmelodious guttural chanting or hooting. It is true enough that hooting is a part of some of their songs and much of their music sounds monotonous enough to our ears; nevertheless, although naturally primitive, their ancient airs often contain melodies of high order.

Their usual songs consist of short musical phrases of eight, sixteen or thirty-two bars which are repeated over and over. Some songs are intended as solos, others are for chorus singing. When several voices of both sexes join they do not divide the parts in such divisions of pitch as thirds or fifths, as employed with us, but only in eighths, the women singing in a high falsetto an octave above the men. Among the Navajos, men as well as women sing falsetto.

That the Indian ear is sensitive to pitch and melody is not only attested in their rendition of the best of their own music, but when trained under white teachers many of them readily learn to sing excellently in "white man's fashion," and acquire proficiency in playing various musical instruments. Many Indian girls now play the piano or organ, and all the Indian schools have good bands composed of students whose

interpretation of classical as well as popular music is notably artistic.

The native musical instruments of the Indians were and still are even more primitive than their singing. The only instrument capable of carrying an air, that was used in the Southwest, was the flageolet or flute. In making up a native orchestra, to the flute they added various sorts of rattles and drums for marking rhythm.

The most commonly used rattles were made of gourds containing pebbles or sheep toes hitting against each other. The time was also accented by beating on a tortoise shell. Notched sticks scraped against each other or rasped by a wand produced a sound which the Indian thought added a valuable note in his orchestrations. Drums were made by stretching skins over cylinders of wood which might be from a few inches to three or four feet long. Or skins might be stretched over a jar, either empty or partially filled with water.

Except where water is used, the pitch of the drum is regulated by warming it over a bed of coals. Low dome-shaped baskets, or hemispheres of large gourds, are also used as drums. Sometimes a half gourd is placed open-side-down in a bowl of water and, when beaten, produces a low, dull note. Singing always accompanies the music of such an orchestra. These instruments are all still used by most tribes of the Southwest.

As we have seen, all Indian ceremonies are religious in character, and in all of them music takes an essential part. The song contains the message to the gods that the dance illustrates in pantomime. Sound, being invisible, can go unimpeded to the spirits of the invisible world.

The air of the song is more important than the words. The gods may not always understand the local dialect, but music, like dancing, is a language universal.

Many of the songs are very old, some so old indeed that the original words have been forgotten and vocables such as "ah-ha, ha-ye, e-ya, e-na, ha-nah," are substituted.

When the words or vocables are used in ceremonials, great care is taken to keep them always the same. If a singer should use a wrong one, and the mistake were noticed, the song must be stopped and the mistake corrected by a hastily uttered incantation, when the ceremony may proceed without disaster. The reason for accuracy is that the approved form has been found in the past to be efficacious, and no risk must be taken by changing it!

When singing for a dance the song may be rendered in one tempo and the beat of the drum in another. In other words, the chorus may be sung in waltz time while the drums beat for a fox trot. The dancers follow the drum.

In the noisier ceremonies, what with all the din of the drums and rattles, the melody is often pretty well submerged. Still it is there and, when the ear learns to pick it out, it is not only interesting to the student as a phase in native development but is pleasing in itself to any one with musical appreciation.

While not a few composers have already developed highly artistic musical compositions from these simple motifs, there is still a great mine of as yet untouched material here awaiting further development.

The range of emotions expressed in Indian music is as great with them as with ours. Women have special songs to accompany different household tasks. In grinding corn they

sing as they slide the *mano* back and forth across the *metate,* or they may sing as they spin yarn for weaving. Women also have songs they use in sending their men off on a hunt or to war.

The lone Hopi may sing as he urges his burro up a rocky trail. Pima and other tribes had a song with which, upon special occasions, they would greet the rising sun. Navajo medicine men sing night after night in the treatment of a patient. Apaches and Navajos as well as other tribes had their scalp, war and death songs.

In one of General Crook's campaigns a band of Apaches was surprised in a cave in Salt River Canyon, in the Superstition Mountains, by a much larger number of soldiers. The Indians were told that if they did not surrender they would be fired upon. Seeing that there was no alternative between death and surrender they sang the death song and defended the cave until the last one of them had been killed.

At the other end of the gamut of human emotions, it may be said that while nothing in the way of music can be fiercer than a war song, or more heart-piercing than the song of death, one can scarcely imagine anything sweeter or more tender than the lullabies with which Indian mothers sing their babies to sleep. Indians have love songs, too. Sometimes the swains woo their ladies with the dulcet tones of the flute.

Dr. Jean Allard Jeancon, director of the Colorado Historical Society, who is a trained musician as well as a notable archæologist and student of modern Indians, in his "Indian Song Book," puts into English words a love song he once heard his native "foster-brother" sing to the

girl of his heart as the two sat beneath his window in their native village.

Over hills, over valleys
Comes the wind—whispering wind.
In the morning, in the noonday,
And at eve—sings the wind.
Always ever, ceasing never,
Calls the wind—calls the wind.
Soft and low, loud and wild
One name calling—calls the wind.

In the mountains when I hunt
Then I call, "Than Tzire!"
In the meadow when I work,
Then I call, "Than Tzire!"
In the evening by the fire,
Then I call, "Than Tzire!"
When I wake, when I sleep,
Then I call, "Than Tzire."

In the night, in the sunlight,
Like the wind, calls my heart.
In the thunder, in the quiet,
Like the wind, calls my heart.
"Than Tzire, sweetest sun-bird,"
Calls my heart, calls my heart;
"Than Tzire, sweetest sun-bird,"
Calls my heart, calls my heart.

Always, ever, like the wind,
Will I call, "Than Tzire!"
Come, oh come, sweetest bird,
For I love you, Than Tzire.
Grind the corn, sing the song,
In my sad home, Than Tzire.
Always, ever, like the wind,
Will I love, Than Tzire.

And the melody is as beautiful and as appealing as the words.

THE WEAVING LESSON—NAVAJOS.

Photograph by Gen. H. F. Robinson

In the same collection Doctor Jeancon has another song, "Homesick." That Indians may suffer acutely from nostalgia when they are away from their people I can personally testify. We had a Pima boy, Jose, who was very much attached to the family, and planned to work for us throughout one winter when we were living in a mountain cabin. After a month or so he grew so ill with homesickness that he lost appetite and weight and, although he made no complaint, I believe he would have died from nostalgia had we not sent him home.

When next I saw him on the reservation he was overjoyed at seeing me, inquiring most solicitously about the different members of the family. "I was very sorry to leave you," he said, "but I was sick for my people."

CHAPTER XXI

EDUCATION

HILE their methods and standards naturally differed widely from ours, Indians have always given careful attention to the education of their children. They had, of course, no schools as we know them, though among the pueblo tribes boys might be taught in kivas by clan leaders. Apache boys were trained in things pertaining to the chase and war. Among the Hopis, boys were instructed in running, in weaving and making such ceremonial objects as katchina dolls, while the girls would be taught corn-grinding or, according to the village she was in, basket-making or pottery. In all tribes both boys and girls were instructed by their elders in tribal legends, why fetishes were to be prized and certain taboos to be carefully observed.

Indian children were treated with uniform kindness. Nothing in the way of corporal punishment was inflicted more severe than an impulsive slap from an exasperated parent. Naturally there was a far shorter list of "don'ts" to remember with an Indian child than a white one. In the Southwest, children under eight or nine were not continually being cautioned against getting their clothes dirty, for the very good reason that except in coldest weather they didn't wear any. Also they were not reminded about brushing teeth, keeping finger nails clean or polishing shoes. They were, however, ever taught to be brave and obedient, to be loyal to the tribe and to shun witchcraft!

They amused themselves in various ways. For playthings

the boys always had bows and arrows and perhaps slings, the girls usually had dolls, and both girls and boys many devices to assist in games.

There was plenty of work for children to do. If there were no lawns to mow, and the family dogs in many tribes might be depended upon to keep the family kettles and bowls clean, the children helped in gathering such wild edibles as grass seed, cactus fruit and piñon nuts, and the boys would shoot small game with arrows, kill them with clubs or trap them. With the nomadics, camp would often be moved; and, with sedentary Indians, growing crops and preserving and storing foodstuffs provided many tasks to keep children's feet and fingers busy.

Then came the white men: Spaniards first, with priests who told the Indian children strange and fascinating stories concerning a new religion and new church heroes, but child education was not greatly changed by them.

Came a new sort of white man who in time brought to the Indian, cities and railroads—and an Indian Bureau. Now things changed indeed for the little brown kiddies, for instead of being willing for them to study in the old way about tribal myths and medicine-man magic—things pertaining to a stone age—these meddling white men wanted them to learn about things of an age of steel, and the magic of electricity and gas engines!

When the Indian Bureau officials first took up the matter of educating the Indian children, it must be confessed, they had the most hazy and indefinite ideas of what ought to be taught and how instruction should be given, so naturally their first essays in that direction were experimental and tentative.

Photograph by Homer L. Morrison

SANTO DOMINGO INDIAN SCHOOL CHILDREN—Loyal citizens in the making.

The day of groping and indecision is now past. The Indian Service has a definite program and it is carrying it out amazingly well. I may frankly say, in the language of the market place, personally, I am "sold" to the modern Government Indian schools. Not that I mean to say that these institutions are perfect, nor that all the teachers have the God-given ability, training and zeal they ought to have, nor that they all have a proper knowledge of the background and the psychology of the Indians, or appreciate their tremendous opportunity and responsibility—guiding children from savagery or barbarism to a degree of civilization in a single generation. But some of them have the glowing vision and all of them have at least a glimmering of the truth, and something of ability and enthusiasm. If they had not they would not have put up with the privations and inconveniences they have endured, nor worked for the pittance many of them in the past received.

Even in these days, when wonderful things are being done for the Indian children, not all of them are being reached, or handled in the best way after they are reached; but aside from all the possibilities that remain for improvement, the work that is being done is so fine, so tremendous, that I know of nothing else in the educational field of America that equals it.

What is it the Government is trying to do for these children? I wonder if I can state it very briefly: It is trying to raise the Indians' standard of living and give them the necessary knowledge so that they may be able to satisfy their created desires; it is trying to give them ideals and the stimulus and self-discipline necessary to live up to them.

The machinery of the educational plan of the Indian

Service includes, (1) reservation day schools, (2) reservation boarding schools, (3) non-reservation boarding schools.

Most of the day schools now teach only the first three primary grades and are located near the children's homes. It is planned, where expedient, to have the number of grades increased up to the sixth. The course of study in reservation boarding schools now usually includes the sixth. While non-reservation schools are primarily designed for more advanced students, when children have no educational facilities near home, superintendents will, if possible, accept pupils even in the lowest classes. Most of these schools graduate their pupils at the end of the tenth grade, a few carry them through the twelfth.

The general plan of school work is vocational; first to fourth year, primary; fifth and sixth, grammar grades, prevocational; seventh and eighth, junior vocational, and ninth to twelfth, corresponding to the usual high-school course, senior vocational.

These highest four grades really constitute the Indian's college. A superintendent of one of the largest Indian schools in the United States told me that about one Indian in ten is capable of completing the twelve grades, and that perhaps one in one hundred would have the capacity to go on through a state university. This, he said, was not so much on account of lack of intellect on the part of the Indian student as his inability to maintain sustained and persevering mental effort.

The day school, the reservation boarding school and the non-reservation boarding school, are all planned to meet different situations in the general educational scheme. Where a tribe is very backward and the parents wholly out of sym-

pathy with the white man's education, the quickest and only practical way to really help the child and to advance the tribe toward civilization is to take the child completely away from his environment and surround him with better things.

Where parents, even to a small degree, appreciate what the Indian service is trying to do, it is often the best policy to allow the children for the first few years to live at home and attend a nearby day school. When conditions are favorable, this arrangement may help the parent as well as the child. Under the right sort of teachers the schoolhouse sometimes becomes headquarters for such community cultural gatherings as parent-teacher's meetings, neighborhood improvement clubs and similar organizations.

Day schools are usually under the care of two white persons, preferably a man and his wife, or mother and daughter, or two close women friends. One of these two will be the teacher, the other the housekeeper, who, among other things, prepares the noon meal which is usually served the scholars.

Most of these day school buildings and their surroundings would look rather bleak to the average visitor. The buildings may be of adobe or of frame construction. There is little or nothing about in the way of flowers or grass. There will be a brown or red earth playground with flagpole and flag; nearby there may be a mission church and a small parsonage, with another dwelling for the family of a white farmer overseer. There might also be a trading post.

If this cluster of buildings is in the desert section, cacti and salt bush or creosote bushes are usually the vegetal features of the landscape. If it is in the plateau country there will probably be great stretches of sage brush or *galleta* grass, with tall cliffs and buttes in the background. In the

Photograph by Homer L. Morrison

SANTA CLARA INDIAN SCHOOL CHILDREN with freehand scissors-and-paper work. These Indians are naturally artistic.

mountains there will be hillsides covered with cedar or pine trees.

Pupils make their first appearance at day schools at ages

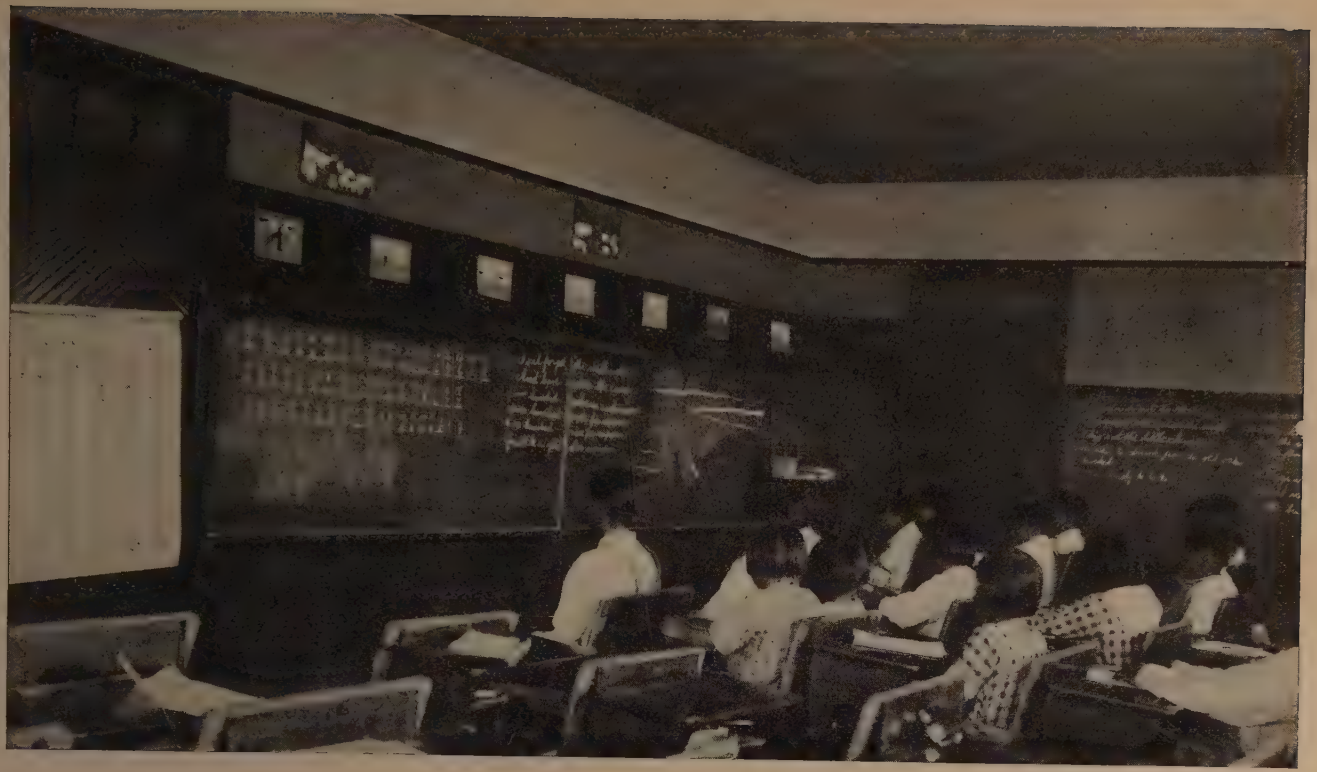
varying all the way from six to sixteen, or even older, most of them speaking nothing but their tribal language.

To the new teacher the task of establishing lines of communication with these strange, shy, brown-faced youngsters at first seems an impossible undertaking. But gradually it is accomplished. The children want to learn; something of their shyness disappears. Those who can talk a little English help those who cannot. Teacher shows them pictures and talks about them. There is singing, and the children quickly pick up teacher's new way of doing it. They learn about the flag, and grow proud to salute it. Teachers make quite a feature of cleanliness both concerning one's person and the schoolhouse. After a while the little brown students even begin to understand how letters make words, and how written words can express ideas. A wonderful achievement!

Older girls help the housekeeper prepare the noon meal and so learn something about the white woman's cooking. Boys help keep the grounds in order, repair the fence, and if there is a school garden, work in that.

The reservation boarding school is usually located at the agency. Here there may be quite a little settlement. There are the boys' and girls' dormitories, a school building, agency administration headquarters, perhaps a hospital, a garage, machine and other shops, a trader's store, a church, and dwellings for superintendent, missionary, teachers and various white helpers.

Non-reservation schools are often located in the suburbs of cities. The two most prominent of such schools in the Southwest are at Phœnix and Albuquerque, the former with an enrollment of 939 students, the latter with 813.



Photograph by Homer L. Morrison

ACOMITA DAY SCHOOL—Red children of the sun learning to add and spell.

The same sort of instruction is given at both the reservation and the non-reservation school. The non-reservation school, however, not only gives its brown-faced students a chance to see just how the civilized white folk do things, but brings them in contact with Indians from many other tribes, both of which things help to broaden their mental horizon.

It is a popular opinion that Indians are lazy. They certainly are not in the Southwest, but in the old days, except for the more than half-civilized Pueblans, they were apt to work only when stern necessity drove them. At the boarding schools the Indian students not only acquire the habit of systematic and sustained industry, but learn that it brings definite rewards. They also learn the value of self-discipline, as well as the benefit of discipline as applied to group endeavor.

Reservation boarding schools receive an annual appropriation of from $225 to $250 a year per student to cover cost of food, clothing, books, lights, heat and other expenses, including teachers' salaries; non-reservation schools, $200. In order to carry out the school program for these amounts it is necessary for the students to do much of the work that in a white school is usually hired.

There is practically always agricultural land tributary to the school. As a matter of instruction, as well as to keep down the cost of school maintenance, the boys engage in gardening, dairying, poultry raising and other farm duties. They also work in the tailor shop making clothes, and in the shoe shop doing repairing. Then, too, there are machine, blacksmith, plumbing, carpenter and paint shops, garages and the like, in all of which the boys busy themselves. Work

Photograph by Homer L. Morrison

LAGUNA INDIAN SCHOOL CHILDREN—They believe in prophylactics.

is assigned according to natural aptitude and, when practical, according to the preference of students.

The girls' work includes cooking, waiting on tables, laundering, nursing and general housework. Each girl makes her own graduating dress. Like the boys, the girls learn by doing.

The days are long and busy. The bugle blows for reveille at 5:55 in the morning; taps is sounded at nine at night.

In some of the schools instruction is given in the native crafts. At the Albuquerque school they have a large room filled with looms for blanket weaving, where an educated Navajo woman, who is an expert weaver, trains Navajo girls in the art.

In health matters pupils are taught such vital things as the value of proper eating, the right sort of clothes, the desirability of personal cleanliness and home and town sanitation; how to recover from acute diseases and how to keep well; how trachoma and tuberculosis are usually contracted and what one may do to guard against them.

The standard of excellence in teaching is steadily being raised. Teachers are now required to do a certain amount of studying at normal schools and colleges during vacations at least every two years.

Both boy and girl students are organized into military formations at the various boarding schools. Superintendents find that it aids students in both physical culture and the development of discipline and self-control.

Squad leaders, or corporals, look after small groups of students at meals, classes and bedtime, as well as at drill. On Sunday mornings battalions of both boys and girls, in smart uniforms, appear on the parade grounds for inspection

and review. Music is furnished by the excellent school bands.

At the time of America's entrance into the World War there was included in the Arizona National Guard a company composed entirely of Indians, most of whom were former students of Indian schools. All of them enlisted for war service and made good records. Two made the supreme sacrifice.

As is well known, many other Indians throughout the entire Southwest also enlisted—over 6000 in all—and served their country gallantly. Sixteen Hopis who had never seen a larger body of water than the village spring enlisted in the Navy.

In spite of all the work done by the Indian students, time is found for athletics for both boys and girls. There are physical-culture exercises, "gym" work and, besides, basketball, baseball and football are all played, the major teams of the schools competing with neighborhood white teams and usually winning rather more than half the time. Instructors say that with Indians, as with white young people, there is nothing like athletic games to teach fair play, and how to be a good loser as well as a generous winner. Indians are especially noted for their clean play and absence of wrangling.

When Indian boys and girls go to school they "sign up" for a certain number of years. At one time it was five years, then three, with a chance for reënlistment. Now it is four. Not all of them graduate.

Upon leaving school some of the students do not return to the reservations. Instead, boys find employment at various occupations in white communities, such as gardening, work in shops, stores or on farms. Many girls enter white families

to do household work and, within limitations, succeed very well. Where many young girls are thus employed as in Tucson, Phœnix and Albuquerque, there is a field matron who, in a general way, looks after their welfare.

Almost without exception the students enjoy their school life exceedingly, and after leaving are very proud of and loyal to their alma mater.

Boys' and girls' agricultural clubs are beginning to be formed by students after they return to the reservation, and their various products—pigs, poultry, calves, and the like, have taken high honors when exhibited at state and county fairs.

In a recent report of the Board of Indian Commissioners is the following paragraph: "Comparing the situation to-day with what it was fifteen or twenty years ago, when it was necessary to resort almost to kidnaping to get Indian children into school, when parents obstinately refused to send their boys and girls to a white teacher, the contrast is startling. It would seem that the cumulative effect of the Government's educational activities in behalf of Indians for the past twenty-five years is taking tangible form; that at length, after many years of discouraging efforts, often in the face of open opposition, the Indian people are beginning to rightly appraise the value of education for their boys and girls. It is one of the most hopeful, heartening evidences of the forward progress of our red friends." [1]

[1] In spite of the splendid achievements of the Indian Service its executives have been greatly hampered by the limited amount of money appropriated for their work. Most of the employees are underpaid; often their hours of work are too long and housing conditions poor. It is especially difficult for the Service to secure and retain high-class physicians, nurses, field matrons and teachers. Many who remain do so solely because they appreciate the supreme importance of their tasks.

Graduating Class, 1926, Phoenix Government Indian School—Tribes included are Pima, Papago, Maricopa, Hopi, Navajo, Yuma.

In following the trail from the ancient Basket Makers to the modern Pueblans of to-day, we see the promise indicated in the achievements of the cliff dwellers and their contemporaries living in the great community houses, after all these centuries, now being richly fulfilled by their descendants. Not only are they coming into their heritage, but their old neighbors, the duller barbarians and the fighting savages, are also proving the real worth of the inner fiber of the Amerind.

The characteristics of these red children of the sun may never be quite our own. Perhaps it will make for richness in the development of the human race, red and white, that they should not be. This very difference may add to the sum of human character.

DESERTS, FOOTHILLS AND MOUNTAINS

CHAPTER XXII

WHEN THE DESERTS BLOSSOM

THE Southwest is preëminently a land of color. Bending over the lowlands is a sky of purest turquoise, or, if one is in the mountains and looks upward, especially when there is the contrasting effect of a few glistening white clouds, he sees a blue of deepest sapphire.

Even on the desert floor there is an abundance of color when one begins to search for it. The ground may be red or yellowish-gray or brown, modified by the varying shades of the unique foliage that scantily clothes it. These wide sweeps of color are broken by vividly hued buttes and small mountains of almost wholly naked rock rising abruptly from the level plain.

In the plateau country the monotonous dull green of the bunch grass is relieved by the coloring of the buttes and the scarped sides of isolated mesas that dot the landscape. The buttes will often show two or three shades of color. Sometimes one sees where dark molten rock has been squeezed up through clefts in lighter colored sedimentaries, like paint from an artist's tube. Often the stratified cliffs of the mesas will bring to mind the contrasting colors of a layer cake. These strata may be yellow and brown, gray and red or many another color combination.

The painted deserts abound in mauves and delicate blues, while in the Grand Canyon, as every one knows, are found

all the colors of earth shaded by distance and illumined in a way that is breath-taking. Add to this the enchantments indulged in by Phœbus Apollo at dawn and evening, when he blends the prismatic colors of the heavens with the hues of earth, and an effect is produced that impoverishes description, and wholly tongue-ties those usually voluble twins, Simile and Metaphor.

The Southwest, too, is a country of light. On the usual clear day mountains sixty or eighty miles away stand out cameo-sharp against the sky. There is no shimmer in the air as when one views the mountains of the Pacific coast; no peaks perennially wreathed in mist, as is often the case in the South Sea islands, or effaced by clouds as happens in more northern latitudes. It is a light so vivid that motion picture machine operators find that they need give their films but half the exposure required elsewhere for the same results.

The therapeutic value of the sun's rays everywhere is beginning to be well known. Their healing effects here seem little short of marvelous. Under the beneficent rays, skin troubles have been dissipated, rickets cured, tubercular joints healed, and even the progress of pulmonary tuberculosis stopped.

The Southwest is a land of many contrasts. There are places in it where in midwinter the weather is warm enough for summer dresses, and men are not too cold out of doors in their shirt sleeves. There are other places here where in midsummer a coat is a requisite for comfort during the day, and at night a campfire a decided necessity. Differences like these of course are caused by variations in altitude; or, in the mountains, upon which side of a ridge one happens to be.

Courtesy Santa Fe Railway Co.

NAVAJO INDIAN PASTURING HIS FLOCKS IN THE PLATEAU COUNTRY.

In considering the natural aspect of the Southwest it is convenient to note that it falls easily into four distinct divisions, each with its own topography, climate and vegetation. They are "deserts," foothills, plateaus and high mountains.

In southern Arizona one finds a typical so-called desert, which, at the Colorado River at Yuma, is about five hundred feet above sea level. Going eastward the ground gradually rises until at Tucson the elevation is about twenty-five hundred feet. In New Mexico the lowest land is seldom under thirty-five hundred feet.

In the northern part of both states, except in the extreme western part of Arizona, is the plateau country. Sometimes the land here is fairly level, at other times gently rolling, and all of it frequently cut through with washes, arroyos and small river beds. Some of these carry water only at times of storms, others have something of a stream in them through most of the rainy season, and still others are constant enough in this land of little rain to be classed as real rivers.

Between the deserts to the south and the high plateaus lies the foothill country, characterized by broken masses of rock, irregularly outlined peaks, cliffs, crags and canyons.

Besides the small mountains and buttes of the desert, and the mesas and buttes of the plateaus, both from the foothills and the plateaus, rise ranges or isolated peaks whose lower and middle slopes may be heavily forested, and in a few cases, with their heads towering above timber line.

Beginning with the desert, the first thing perhaps the traveler will notice is the great difference in the vegetation in different localities. While this is due principally to variations in moisture, quality of soil is also naturally a contributory factor.

Generally speaking, in the Southwest the least rainfall is encountered at the lowest levels, and increases as the land rises. Additional moisture, of course, is afforded plant life at the base of mountains or in other places where there is favorable drainage.

As to soil, it may surprise many to learn that the soil of the desert, for the most part, is quite fertile, varying in quality from gravelly loam to heavy adobe, and only needs irrigation to produce good crops. Occasionally areas are encountered where the land is so impregnated with alkali that the surface is encrusted with salt or soda. In still rarer instances are found places, like among the dunes to the east of Imperial Valley, California, where the country is so sandy that only a type of vegetation peculiarly adapted to such an environment will grow.

In the Yuma country, where they have not more than two or three inches of rainfall a year, the desert covering naturally is scant, but as the land steadily rises to the eastward, by the time we come to the longitude of Phœnix we find desert growth not only fairly vigorous, but consisting of many forms. Here will be bushes, dwarf trees and the ubiquitous cacti, all unique in aspect and strange in habit; and if they seem forbidding with their bristling thorns, remember that some time during the year they will also bear friendly blossoms.

Before going into details regarding the many different varieties of desert growth, it might prove interesting to inquire whether climatic conditions here have always been as we find them now; how plants happened to come to such an inhospitable place, and being here, how they are able to exist, where an average flower, shrub or tree properly

brought up in a humid climate probably could not endure through a week.

It is not an unnatural impression the deserts of the Southwest give to many of us, that they are places of vast antiquity. One has the feeling that these strange cacti with their deep-wrinkled, indurated skins and hoary stubble of thorns are no younger than the very rocks which rise from the grayish-brown floor, and that the desert landscape as it is to-day, has always been. Yet men wise in Nature's secrets, those who have read understandingly the book of the desert country, tell us that some twenty millenniums ago—but a day as the life of the world is counted—these desiccated plains were lush meadows watered by copious rains, the home of tall waving grasses, luxuriant shrubbery and trees.

Or to adventure still further into the past, say twenty or thirty millions of years ago—even the wisest must approximate vary broadly regarding geological periods—in the Post-pliocene, we see the blue waters of the Pacific covering these plains.

The Pima Indians have a story of a flood as well as had the ancient Hebrews. The Indian Ararat was the Sierras de Espuma, that group of mountains now known as the Superstitions, whose bold escarpments look out westward toward the valleys of the Salt and Gila, and upon whose crest, monumented in stone, are still to be seen the markings of the foam where the legendary surf broke against the topmost rocks.

Strangely enough it was these mountains that, during this mighty depression, formed the southwestern seacoast of what is now the United States, and the tops of the Sierras de

Photograph by Stephen H. Willard

SAHUAROS OR GIANT CACTI (*Cereus giganteus*)—Lords of the desert, with such retainers as "Prickly-pear," "Monkey Tail" and "Cucumber" cacti at their feet.

Espumas were headlands washed by the blue waters of the Pacific.

At this time the Grand Canyon of the Colorado was an estuary, and, south of the Mazatzal range, the Catalina mountains, the Rincons, the Santa Ritas, the Huachucas and the Tucsons formed prominent islands in an outlying archipelago. This condition lasted for many millenniums, until in the course of time the land that during these long ages was a bench under the shallow sea, slowly, inch by inch, again raised itself above the blue waters to sun and air.

It was during this long period of the Pliocene and the following Pleistocene that an anthropoid animal who ran principally on his hind legs, and whose front armlike limbs had already developed hands, his mental processes sharpened in eluding savage beasts and overcoming a myriad of natural perils—and perhaps as well, urged on by an irresistible impulse from within—left the ranks of beasts and became man.

Following the Pliocene, it is thought by one school of astronomers, that the earth, which perhaps followed an orbit nearly circular during the warm, pleasant weather of the early Eocene, now attracted by the influence of outer circling planets, began to acquire a more elliptical circuit about the sun, which steadily, though slightly, increased from year to year. Its axis of rotation, too, tipped farther over to the plane of its orbit, with a result that the winters grew longer and the summers shorter, until by reason of this, supplemented by other causes, very deliberately, but none the less inevitably, the age of ice advanced.

Four glacial periods there were, each lasting for thousands of years, with intervening periods of mild and equable

seasons between, which, too, had durations of many millenniums.

At the peak of the glacial age, when ice sheets in the mid-western part of the United States came as far south as Kansas, the higher mountains in the Southwest were subject to tremendous snowstorms, while the lower slopes were deluged with torrential rains. What are now dry arroyos were large, never-failing streams, while water courses like the Rio Grande and the Salt and Gila, were rivers rivaling the Colorado as we know it to-day.

These frequent and copious rains naturally produced luxuriant herbage, and, following nature's plan, grazing animals which included camels, giant bison, mammoths and mastodons developed to feed upon it, and preying on them were such carnivora as great wolves and bears, the pre-historic American lions, and the saber-tooth tiger.

Then—it might have been fifteen or twenty thousand years ago—whatever influences there were which had brought about the glacial period altered, the earth again grew warmer, the ice fields receded, snow and rain in the South-west greatly lessened, and desert conditions began.

With this desiccation of Pleistocene conditions came great changes in plant life here. Many of the grasses, shrubs and trees which for so many centuries had found a congenial home in the Southwest perished, and others were pushed back into the hills and mountains where the tropic sun beat less fiercely and where rains were still comparatively frequent.

As the succulent vegetation diminished in quantity the giant mammals disappeared, and with them the larger of the cats, now deprived of their prey, also vanished. But while, as we have seen, much of this plant life perished,

there must have been a remnant of the more adaptable species that, either through natural selection or by mutations in descent, endured. At the same time other plant forms, which had already equipped themselves for desert conditions in Mexico and Central America, gradually came up from the south.

CHAPTER XXIII

DESERT PLANT PIONEERS—TREES AND SHRUBS

PLANT life, as we all know, had its beginnings in protoplasmic awakenings where the sun shone kindly upon shallow water. The early cell forms required the continuous presence of their mother body of water; and before they were, so to speak, able to remove themselves from this wet cradle and go adventuring upon even moist land, they had to be equipped with many marvelous devices, if they were to endure.

In the hands of that capable nurse, Evolution, all sorts of ingenious things were done to them or by them in preparation for altered conditions.

So that they might hold their heads properly in the air they learned first to plant their feet firmly in the moist earth. Perpetuation of species by division of cells had to be changed to a different plan of descent. First a scheme of utilizing spores was tried, and later that amazingly complex but highly efficient plan of making seeds fertile by means of blossoms, with their pistils and stamens, was worked out.

There are enthusiastic botanists who believe that plants as well as animals have minds; that indeed some plants have better minds than many animals, and what is more, these scientists come near to proving their theory. Certainly we must agree that plants have individuality and character, and develop shrewd as well as heroic qualities.

With this in mind we hold to the belief that the medal of

the Legion of Honor for courage, and the Industrial Prize for persistence and ingenuity should be awarded to those gallant plant colonists of the desert of the Southwest.

If there can be a manner of living that is farther from the lagoon, where plant life started, than a desert whose minimum rainfall may be as little as an inch or two a year, and where periods of absolute drought may extend for eighteen months or more, one is at a loss to conjecture what it could be, especially when there may be a fluctuation of temperature from freezing point to a degree of heat that would cook an egg.

In midsummer the thermometer will register from 105 to 120 in the shade. The air palpitates with the heat. If there is a breeze it feels like a blast from an oven. The sun scorches one's skin. Hot spirals of swirling air currents form dust cones here and there in the landscape.

In July, if the day has been unusually hot, perhaps an hour or two before sundown the wind will rise, driving clouds of dust or fine sand before it. The air for an hour is choking to the traveler, then possibly clouds will form. Sometimes moisture will start dropping from them, only to be sucked back by the heat and dryness of the air. Occasionally a perceptible sprinkle will reach the earth, and, after several evenings of such weather, there may be a real rainstorm, accompanied by thunder and lightning. When the brief storm is over, night will come on, cool and delightful.

Indeed, on almost any summer night the contrast between it and day is nothing short of amazing. The burning heat of the air is gone, the fierce glare of the sun forgotten, and the harsh outlines of the thorny growths are softened by starlight or the silvered beams of the moon. The witchery

of it not only grips one when first experienced, but it is always one of the joys to the desert dweller that "time does not lessen nor custom stale."

Still, to the experienced person in good health, as to these heroic plants, the July and August desert, even by day, is not at all an impossible place. In pioneer times Apache Indians used to make long journeys afoot across it in midsummer. Naturally, they would travel at night by preference, but not hesitating to keep on their way by day if circumstances demanded.

The Papago and Pima Indians, as we know, living in the heart of the desert, work in their fields the summer through, and men, women and children join in the harvest of cactus fruit which ripens in July—out in the sun all day without serious inconvenience. Also, white laborers working on ranches in desert oases pursue many outdoor farming activities during the very hottest weather. Prostrations from heat are exceedingly rare. When a man is engaged in hard labor under such a sun, it takes considerable moisture to liquidate his internal anatomy, and it will perhaps not surprise the reader to learn that a man working about a harvester will drink two gallons of water or even more a day.

Whatever any one may think of the desert country in summer, all who know it unite in saying that in winter it is a place of unalloyed delight. The mornings are crisp, with sometimes a decided touch of frost in the air. Sometimes it is cold enough to put a skim of ice on shallow standing water. Up until noon it will be cold enough to make brisk exercise a pleasure. The afternoons are golden, with the sun not too hot nor the shade too cool.

This, then, is the land that the plants of the Southwest

have reached in their long journey, through many ancestors, from the lagoon. And these children of the desert accept their adverse conditions so gallantly, so bravely! Their skins may be wrinkled by inclement weather, and their wardrobe of leaves shabby enough, yet when the days of their spring fiesta come they smilingly hide all suggestions of poverty in the bravery of their blossoms.

It is interesting, too, to notice the ingenious methods used by the various plants in order that their living may not only be possible, but, in spite of their difficult environment, fairly comfortable. With all the plants every precious drop of water obtained either by direct rainfall or by drainage must be economically, even parsimoniously, used.

As has been suggested, none of these valiant colonists can afford the luxury of large leaves. Large leaves demand too much water; so not only do the plants adopt the fashion of wearing them small, but sometimes, after a short spring season, discard them altogether.

A conspicuous example of this is found in the palo verdes. Only in the favorable weather after winter rains will they indulge themselves with their tiny leaves, even though they know that their poverty will demand that they be soon left off. During the desert spring fiesta, in April and May, these trees fairly cover themselves with a flame of yellow blossoms. The ocatilla, too, is of the same brave, gay school, only she wears her colors in March. First blossoms of the spring they are—these brilliant red tips on long coachwhip stalks.

After the leaves of both these plants are gone, philosophically getting down to stern realities, they manufacture the life-sustaining chlorophyl by means of their bark.

The mesquite tree, one of the most prized of all the Southwestern growths, is not only found in the low-lying deserts but well up through the foothills to an altitude of about a mile.

In the dryest places in the desert it is scarcely better than

Photograph by Stephen H. Willard

PALO VERDE TREE (*Parkinsonia microphylla*)—A yellow flame of blossoms in April or May.

a big scrubby bush, but if it has even a fair chance at moisture from its location in a wash or at the base of a hill, it may develop to the size of a mature apple tree.

It belongs to the Mimosa family, with many small, light green leaves. The lemon-yellow flowers which appear in May and June are very much in favor with the bees, who convert their nectar into delicious light-colored honey. The beans, which come later, not only provide excellent forage for stock, but in times past were used in a number of ways as food by Indians.

Branches of the mesquite make excellent fence posts, and if properly treated show great resistance against decay. Branches, trunk and roots alike afford one of the finest firewoods known.

As found on the desert the mesquite develops a wonderful system of roots, which will, if necessity demands, penetrate the soil for a distance of forty or fifty feet in search of moisture.

As an illustration of the influence of environment on plants it may be mentioned that the mesquite tree has been exported to the Hawaiian Islands, where, known as the algaroba, it is considered the most valuable tree in the archipelago.

After the education the mesquite received in economics in the Southwest's Spartan branch of nature's school, once it found itself in the moist and mild atmosphere of the tropics it exuberantly expanded into a tall, wide-spreading tree, many times exceeding its previous proportions.

However, like many another *nouveau riche* its prosperity most decidedly went to its head—too much so for the stability of its roots. Whereas, before, the tree was anchored

as securely to the soil as a mountain to its base, what with the moisture the air supplied and the frequent rains that gave its roots all the drinking water it wanted right at the base of the tree, why work? they decided—why send out long shoots looking for water when it was delivered at its very trunk? Consequently when the winds came, very often poor Algeroba Mesquite toppled over and took the count.

The palo fierro, or ironwood, although found all through the desert area, has an ineradicable aversion to high altitudes, and never strays from the district of the ardent sun. It is a member of the pea family, and late in the spring puts forth a lavender flower, followed in due time by a little pod of peas, which has a place in Indian menus.

The wood of the palo fierro is as dark as mahogany, and takes a high polish. Heavy enough to sink in water, in former times it made a most admirable war club, and was also used by the Indians in fashioning wooden spades and planting-sticks.

Contrary to popular belief, there is no sagebrush growing on the deserts of southern Arizona, it being only found in certain localities in the plateau region. The plant usually mistaken for sagebrush on the lower desert is saltbush, of which there are several varieties. Some of these are quite woody, and are used by the Indians for fuel; others, more herbaceous, are not only eaten by stock but are cooked by the Indians with various foods to give them a peculiar salty flavor.

The creosote bush is perhaps not only the most numerous of all the plant colonists of the desert, but the hardiest as well. All through the lowlands of the Southwest it is found, and extending westward across the deserts of California and

far south into Old Mexico, asking no favors as to favorable location for drainage or freedom from heat. The one rule that it seems to insist upon in personal government is that the intervals between the bushes shall be ample enough so that each may have an equal show for what little moisture there may be available.

If it is fortunate enough to find a home where the annual rainfall is as much as ten inches it will use it and grow tall and opulent. If it is in a location where two inches is the maximum, it will tighten up its metaphorical belt and manage the best it can with that. Naturally the bushes will not look so prosperous nor get their heads so high in the air, but they will endure and with the new leaves that come in February there will be tiny gold blossoms as well, which if conditions are at all favorable, will last through March and perhaps a bit later.

In their struggle against drought conditions the creosote bushes seem to place their reliance in just two things—they varnish their leaves with a sticky gum which reduces evaporation and, as we have seen, have a root system that is the epitome of efficiency.

Plant diseases apparently are unknown among them. Like the farm rooster, the longer they live the tougher they get. But while the rooster finally succumbs and graces the table for Sunday dinner, the creosote bushes live on and on, and no man yet has lived in the country long enough to find out when they die.

CHAPTER XXIV

CACTI

T is the cactus, however, of all the plant denizens of the land of little rain that commands our greatest admiration, for he it is, of all the forms of plant life in the world, that has gone the longest journey from the moist cradle in the shallow lagoon and pond, and has most completely built up his defenses against desert conditions.

The family embracing the greatest number of near relations is the opuntia which, growing in bush form, has jointed thick stems, flattened, as in the case of the well-known prickly pear, and rounded, as is seen in the black sheep of the family, the ill-reputed cholla.

The prickly pear, as everyone knows who is familiar with the Southwest, is the wanderer of the family. Few if any of this subspecies have any special liking for the hottest parts of the desert. On the other hand some members of the family flourish close to the ocean in southern California, while others find a congenial home in altitudes where in winter zero weather will be encountered.

While doubtless the prickly pear does not intentionally grow his branches for fodder, yet owing to the fact that, in a number of varieties, his spiny joints make succulent browse, he stands high in the esteem of desert herbivora.

He is also most kindly regarded by many humans for the excellent quality of the crimson fruit in which he encases his

seeds. Under the name of nopal, one variety affords a fine food especially liked by Mexicans.

Cousins of the prickly pears are the cylindrical opuntias, which form a large family of their own. There is the staghorn, the coral and the monkey-tail, which as may be suspected, receive their common names from their appearance.

There are several members of the opuntia family with distinctly evil reputation. These grow from waist-high to quite a bit above a man's head, with many wickedly thorned, cylindrical branches. Notorious throughout the Southwest as the worst of the group is the cholla, (pronounced choya) the *Opuntia fulgida.* Sharing the *fulgida's* bad name is the *mamillata* whose branches are a little greener, with the spines a bit shorter and more sparsely set. This variety, too, is usually called "cholla."

The worst piece of villainy charged to these two species is the way they seem to fairly throw their short, thorn-covered joints at one. Let a person's hand but barely brush the plant and there is a little ball of spines sticking fast to the skin, when, with every movement, the thorns start working their way toward the bone.

Horses and dogs, as well as men, often get the cruel bunches of thorns attached to their skin when they venture too closely to the plants.

The *bigelovii,* another bad brother of the *fulgida,* has its branches so closely covered with spines that there is not room for a pencil point to be placed between them.

And yet even this misbehaving trio have redeeming qualities. Of course, being cacti, they produce beautiful blossoms, coming out in April, May and June with colors ranging from yellow, yellowish red and yellowish purple to bright

Photograph by Stephen H. Willard

CHOLLAS (*Opuntia fulgida*)—The cruelest cactus of the desert.

crimson. The fruit, which is not attractive to humans, varies in color from red to yellow, and often remains on the branches for a year or longer.

Now let us give them another credit mark. While their excessive armament has injured their reputation with horses, dogs, and humans, many beasts and birds find a virtue in their very thorniness. Thrashers and other desert birds fearlessly nest among their branches and thus secure much protection against hawks, owls and such predatory animals as coyotes and wildcats. Desert rats will take fallen dried joints of these opuntias, and so skillfully do they handle them that, without injury to themselves, they will make barricades about their runways as a defense against coyotes and desert foxes.

It would seem to the casual observer that the cylindrical opuntia would be an impossible food for forage animals, yet in the land of the Papago Indians, south of the Southern Pacific track into Mexico and west of Ajo, an important feed for cattle are these same thorn-bristling chollas. Indeed, they not only provide them with food but furnish a substitute for drinking water! Incredible as it may seem, the juice that is contained in the spiny joints is all the moisture that some of these cattle get from one rainy season to another.

To see an old range cow eat opuntias is a spectacle beside which the feat of the gentleman at the vaudeville, when he apparently consumes fire and swallows a sword, seems a tame performance.

If it is a prickly pear the performance is easy enough. Taking one end of a branch in her mouth Madam Cow will sweep the ground with the rest of it until the thorns are

somewhat subdued, then, with every indication of satisfaction, she will proceed to munch it.

With the cholla, her procedure is somewhat different. A joint of the terrible spines is bitten off somewhat gingerly. Raising her head, she worries it around in her mouth until the thorns are well immersed in saliva, chews at it for a munch or two or three, when the awe-stricken beholder sees it slip down her gullet. No, she doesn't drop dead or even have the colic, but gazes at you calmly and seems to indicate by her manner that the trick is rather easy after the first thousand or so.

Carl Lumholtz quotes a Mexican gentleman as saying that he had milked cows that had each given over one litre of milk every morning from the end of March to the middle of June, although the only moisture they had consumed during the time was sap from cactus joints.

As one looks at these various cacti he naturally wonders just why Mother Nature provided so many of the desert growth with thorns and why she was especially prodigal of them with cacti.

The commonly accepted theory for many years was that it was given them as a protective armor against herbivorous animals. In spite of the performances of the cattle of Papagueria the thorns, of course, cannot help being a deterrent toward consumption by such natural consumers of desert herbage as rabbits, and in an earlier day when wild life was plentiful, by mountain sheep, deer and antelope.

Nevertheless, botanists familiar with desert conditions say that they have been forced largely to abandon that theory. In the first place, thorns do not protect cacti at the stage in their life when they most need guarding. When as seed-

lings they first push their way above the soil, and are particularly attractive to grazing animals, thorns are either nonexistent or so soft as to form no defense at all.

A theory that is substantiated by better evidence, though even here there are obstacles, is that plants now found on these deserts have developed from parent types that had a much greater spread of branches and leaf surface; that in their struggle to endure against drought conditions, not only

Photograph by McCulloch Bros.

CUCUMBER CACTUS (*Echinocereus fendleri*)—These lovely blossoms appear late in March.

have branches become reduced and spine-tipped, but, in the case of cacti, even leaves have become thorns, and many of the functions of the leaves taken over by the bark. Our botanists freely confess that it is not easy to defend this

theory from every standpoint, yet in general it appears to be a correct one, and they call attention to the fact that in moist forests there are certain forms of tree cacti that have true leaves very similar to those of other plants, although these will also have a number of spines in their axils.

Beautiful blossoms of the prickly pear (*Opuntia engelmannii*).

One of the earliest cacti to bloom in the spring is the cucumber (*Echnocereus fendleri*) which rises from the ground in a clump of cylindrical, fluted, thick thorny stems a foot or more in height. In late March, growing out of the end of the thorny stalks, will be a few brilliantly hued magenta or crimson flowers.

A very tiny desert cactus is the pincushion (*Mamillaria grahami*). This plant-pigmy shows itself as a small ball about the size of a door knob or a very fat link of sausage,

and is covered with little stars of fuzzy spines out of which grows a tiny fish hook. Its fruit is an elongated scarlet berry.

All cactus blossoms are beautiful. Delicate and fragile they are, lasting but a day, without stems and so closely guarded by sharp thorns that it is impossible to remove them with the naked hands; yet they are the admiration of all who know them. Indeed, what with the satiny sheen of their petals, their rare tints—yellow, pink, red, magenta, purple and maroon with many an intermediate tint—their unique and exotic loveliness vies with any flower in the world.

And the queen of them all is the night-blooming cereus! This assuredly is not on account of the appearance of the plant, for nothing could be less impressive than its thin, wabbly, corrugated stalk rising in this Southwestern desert uncertainly to a height of from three to six feet. But when it comes into bloom with its wonderful bell-shaped, fragrant flowers eight or nine inches in length, with their many cream-white petals and stamens, often tinged with pink and brown, then indeed may the royal orchid herself pay it homage.

And even the plant commands our admiration when we learn how it works to produce its flowers. Down in the ground at the foot of its stalk is a great bulbous root that makes one think of an humble, eternally working gnome who patiently labors the year through so that its dream children in the air above may for one night in midsummer, under a witching moon, perhaps, have their few hours of pure delight.

If the night-blooming cereus is queen of the cacti, then easily the king, not only of the cacti, but of all the desert growth is the *sahuaro* (*Cereus giganteus*) the giant cactus.

Twenty or thirty feet and even taller it stands, a fluted cylinder from which are thrown out thick branches that rise parallel with the parent stock.

And the simplicity and the efficiency of its equipment and methods for living comfortably in adverse surroundings! Here all branches, twigs and leaves have been reduced to a row of spines on the ridges of its fluted columns, and the green trunk and branches with their silky covering not only do the work of leaves, but act as a reservoir for moisture.

Ability to support its weight is found in a strong root system and a circle of upright ribs reaching from roots to crown. When the rains are abundant the roots quickly transfer moisture from the soil to the trunk, when the fluted surfaces, shrunken perhaps after months of drought, grow fat and green, holding the moisture thus obtained for months or a year if necessary.

If a rainy season continues long enough and there is more moisture than the sahuaro's existing supply of flutings will accommodate, it may add an additional row or two for a few feet along its corrugated sides, like a gusset let into a tight garment.

The blossoms of the sahuaro appear at the tops of the main stalk and branches, where they make crowns of creamy white flowers. These usually appear in May. Late in June the fruit forms, which in size and shape resembles a hen's egg, though its color is crimson. Its deep-colored, juicy flesh holds numerous black seeds, and is covered with a strong spiny skin.

Until recent years the sahuaro fruit had a leading place in the dietary of the Maricopa, Pima and Papago Indians. Indeed even yet the Papagos use its extensively.

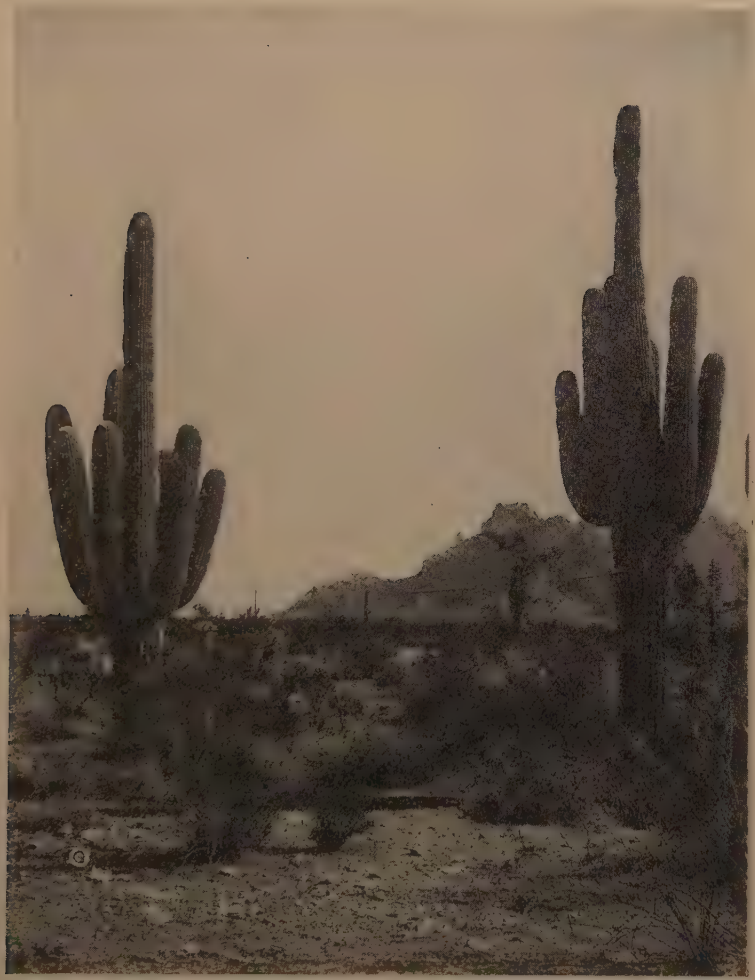
The fruit is collected by means of a long pole, usually a rib from a decayed sahuaro with a little cross piece at one end. The fruit is eaten raw as it comes from the cactus, also cooked, and otherwise prepared for food. A sort of a jam is made of the pulpy part, and the juice is boiled down to syrup and kept in small well-sealed jars. The seeds are ground and pressed into cakes.

From time immemorial the sahuaro harvest has been the most important event of the desert Indian's calendar, and in years gone by, and even yet, in isolated places in Papagueria, its close was and still is marked by ceremonials, dancing and feasting.

The Pimas and Papagos have always been notable for their sobriety, but every year, at the time of the sahuaro fiesta it was considered wholly proper for the men to break the rule and drink libations to the tribal Dionysus in sahuaro wine. Sometimes after the braves had absorbed enough of the fermented cactus juice they would become quarrelsome, when the ladies would discreetly climb to the tops of their granaries or kees and leave the ground to their muddled spouses. The next day sobriety would return to the villages for another twelve months.

Now that we have paid a well-deserved tribute to the lordly sahuaro, we want to add a few words of praise regarding his small stepbrother, the bisnaga (*Echinocactus wislizeni*), the little lifeguard of the desert.

To the casual observer the bisnaga might seem but a young sahuaro, but, when we compare the two plants closely we see that where the sahuaro spines are straight and light in color, those of the smaller plant are pinkish, and their points have a fish-hook curve at the ends. Also



Photograph by McCulloch Bros.

ARIZONA DESERT NEAR CAMELBACK MOUNTAIN.
SAHUAROS IN FOREGROUND.

the bisnaga, while it has the fluted column of the sahuaro, usually does not attain a height of over four or five feet, has no branches, and its flowers are reddish and lemon-yellow instead of cream. In its interior anatomy the bisnaga has no circle of supporting upright ribs, but instead it is filled with a white pulpy substance that suggests immature watermelons.

If the top of the bisnaga is cut off, this pulpy substance may be crushed or mascerated with a sharpened stick, when enough waterlike sap can be squeezed out to quench thirst. Many times it has preserved the life of Indians and other travelers crossing the desert in summer. The taste of the sap is not unpleasant, though if decanted into a canteen it soon sours.

Pima Indians eat the pulp dried, and Mexicans boil cubes of the pulp in sugared water. Modern candy makers crystallize the pulp in sugar and make a delicious confection.

A desert growth that always commands attention is the crucifixion thorn (*Holacantha emoryi*), which apparently is an effort on the part of nature to see if she couldn't make a plant that was just all thorns—and nothing else. If that was her object, she succeeded. I have never seen one in leaf or in blossom or with fruit. It's just a mass of small branches each terminating in a cruel thorn. It's a lonesome looking object—a little like a soured misanthrope who offers the world the worst and expects nothing better in return. Some way one feels sorry for it.

CHAPTER XXV

DESERT ANNUAL FLOWERS

WHILE the trees, bushes and cacti mentioned make far from a complete list of the growths of the desert, they include the more conspicuous, and give a fairly accurate picture of the perennial vegetation of the district.

When we come to consider the varieties of annual plants to be found here, we discover that they have worked out a wholly different scheme of defense against heat and drought from that practiced by the perennials. To this end they have developed a capacity of completing the entire cycle of existence from first shoot to blossom and seed formation within the few weeks following seasonal rains. Some of these species start growing after the winter rains of January and February. Others do not appear until the summer showers of late July and August.

A remarkable feature of these two classes of annuals is the way in which their seeds lie dormant when environmental conditions are not of a sort to suit their idiosyncrasies. Seeds of winter plants drop to the ground in March and April. In due season the summer rains come and thoroughly moisten the ground. Do the seeds then quicken and send forth shoots? They do not. As Dr. D. T. MacDougal says in his "Botanical Features of North American Deserts," "The experimentalist who attempts to grow these plants during the summer will find that he might have sown so many pebbles in his pans."

And like pebbles they remain during the rest of the summer and through the cool days and cooler nights of November. But if Jupiter Pluvius is kindly and provides rain in December, or January, or February, then these winter seeds push rootlets down into the soil and lift their heads upward to sun and air, where buds will quickly form and unfold into blossoms, so that by March or April, in favored spots, great flower beds will brighten the desert landscape.

However, not every year do winter rains come in quantities to moisten the earth sufficiently to start the seed. Under such conditions, untempted by the summer rains' seductive enticements the seeds will wait until a succeeding winter season happens along which produces conditions touching a responsive chord that means life and growth.

On the other hand, seeds of summer plants will not be quickened by winter rains, but, with as much apparent phlegmatic patience as that which characterized the annuals of winter, they will remain apparently lifeless until the summer rainy season comes, when the sun shining on the moist soil after a shower will produce atmospheric conditions resembling the hot room of a Turkish bath. Then the little seedlets will murmur happily: "Thank goodness, we seem to be having a little decent weather. The frost certainly ought to be out of the air at last. Let's poke up a finger and find out if we can feel a draft any place."

Doctor MacDougal suggests that the delayed germination of these seeds arises from the fact that they need a certain length of time for carrying out the "slow changes toward maturity, which take place during the so-called resting season. Also it is quite possible that in some species the baking summer heat, the moist soil, the cool nights of autumn and

the rains are a series of stimuli which must follow each other in turn and act for a length of time before the seedling emerges from its protecting coats."

The more common sorts of winter flowering annuals are golden poppies, purple phacelias, blue covenas and larkspurs, thistle poppies and bright flowering gaillardias. Other flowers less in evidence at this season are tidy tips, cream cups, anemones, desert stars, daisies, borages, fairy dusters, gilias, wild flax, evening primrose, desert holly and the beautiful Mariposa lilies.

There are more than two hundred early blooming flowers, most of them small annuals that, under favorable conditions, will blossom during the cool moist weather of late winter and spring. Some of these flowers will be found at the base of the foothills or buttes where they receive extra supplies of water; some nestle under mesquite or ironwood trees whose partial shade prevents too rapid evaporation; others boldly fling colored banners of gold, orange and amethyst in great beds across foothill slopes and desert floors.

Accounts of the experiences of travelers in pioneer days crossing the deserts of the Southwest rarely fail to mention that strange optical illusion, the mirage. A caravan is slowly moving through a wide expanse of country where the parched brown earth is but sparsely covered with stunted bushes and gaunt cacti. The plain shimmers under the terrific heat of the summer noonday sun. The water supply is all but exhausted and, uncertain of their position, scouts ride ahead looking for an expected river or desert tank.

Suddenly, mounting a little rise of land, a few miles ahead of them they see a beautiful sheet of water—a lake surrounded with green trees. As wondering they gaze upon

the welcome scene they see the surface ripple and the boughs of the trees move to a gentle breeze. With joyous shouts they ride forward when, in a strange way, the water seems to recede as they advance and then abruptly vanishes altogether, leaving only the parched desert to mock them.

Phenomena such as these, that once seemed so mysterious and unexplainable, we now learn follow well-known laws of physics. Mirages are produced when the lower layers of the air by contact with unusually cold or unusually hot ground, and by radiation, become considerably denser or more rarified than the atmosphere above them. Under these conditions the lower stratum becomes like the surface of water or a sheet of glass, and by reflecting and refracting the rays of light, causes images of distant objects to appear suspended in the air as they would show in a mirror.

A wide, nearly level plain, such as we have already suggested, is a favorable setting for a mirage. Perhaps there will be a slight depression a mile or more ahead of the observer which will, at that distance, seem filled with water; and small mesquite trees, their apparent size being doubled through the added reflection, form borders for the phantom lake.

When camping on the desert I have seen above a chain of low mountains their inverted image, producing the illusion of a tremendous flat-topped range pierced by many weird holes or tunnels. Sometimes when the lower stratum of air is much denser than that above it, the rays of light from distant objects are deflected or bent downward so that to an observer objects seem to be lifted up, thus permitting him to see things which are beyond and below the horizon. When this phenomenon is added to the more common details of a

mirage, the mystery of the apparition is greatly increased. On the Arizona deserts I have observed distorted images of banks of smoke from Southern Pacific railroad engines which were moving along the tracks below the horizon, and thus brought into view they appeared to be huge icebergs floating over the surface of a desert sea.

A peculiar natural phenomenon observed on rare occasions in the desert country on moonlight nights is the lunar rainbow. Lacking the prismatic coloring of the bow of the day, in their varying, delicate, luminous shades ranging from dark gray to lightest pearl, these lunar bows have a beauty of their own that is both haunting and fascinating. Once seen, their ghostly loveliness is never forgotten.

Other celestial phenomena which occasionally are seen in the skies of the Southwest are halos appearing about the moon or sun, dyed in the vivid colors of the spectrum.

These most interesting phenomena have a radius about the same as the usual colorless "ring around the moon," and while the tints are not so pure as seen in the usual rainbow they blend with each other in luminous harmony. The inner margin is defined with a line of red followed in outward succession by bands of orange, yellow and green, with a final outside circle of pale violet.

Both solar and lunar prismatic halos are caused by refraction of light rays shining through a lofty thin stratum of clouds composed of tiny hexagonal ice needles. They may be seen either in summer or winter.

I had the pleasure of observing a very beautiful lunar halo at Chandler, Arizona, in March of 1927. A group of Hopi Indians was giving a program of ceremonial dances at the town's famous winter resort hotel. The leader of the

dancers, Quoi Huya, was much disturbed by the spectacle, and said it presaged a very big wind the next day.

"Isn't there some way you can stop it?" asked a guest anxiously. "We all want to go on a picnic to-morrow."

The chief considered. "We have a ceremonial song that is very good medicine for big winds; maybe it stop him."

Then said the guests with one accord: "For goodness sake, sing it!"

Sing it they did—all the dancers—and they put their hearts in it. Who may deny the potency of their medicine? The weather the following day was ideal—perfect for the picnic!

CHAPTER XXVI

PLANT LIFE IN FOOTHILLS AND MOUNTAINS

As we have already indicated, what we call the foothill country lies between the lower deserts of southern Arizona and the high plateaus and mountains, attaining an altitude of a mile or more, to the north, northeast and east. This is such a section as one travels through on the Apache Trail from the southwestern end of the Superstition Mountains to Roosevelt, or that portion of the Phœnix-Prescott highway between the Arizona Canal and Antelope Hill.

It is a broken land with much naked rock, many buttes, canyons, cliffs and peaks, their ever-varying form and color bringing continuous delight to the lover of the picturesque.

In its vegetation, while such desert growths as the mesquite, prickly pear, ocotillo and in some places even the giant cactus continue, the especially typical plants of the foothills are the yuccas, sotols and agáves.

There is quite a family of the yuccas. Some form their great rosettes of bristling, daggerlike leaves directly on the ground. Others, like the *Yucca radiosa,* have thick stalks like tree trunks, branching breast high or higher, the stalks terminating in characteristic leaf clusters.

A still larger yucca is the Jushua tree, *Cleistoyucca arborescens,* which attains a height of from fifteen to thirty feet. Even the giant cacti present no more striking or pic-

turesque appearance than do these unique sentinels of the higher deserts and foothills.

All of the yuccas have great clusters of waxlike flowers ranging from greenish white to yellowish white, and as they sway in the upland breezes on their tall stems they make unforgettable figures of beauty in the landscape.

Our Lord's Candle, often known as the Spanish bayonet, the *Yucca whipplei,* has an especially lovely shaft of blossoms. Rising from a cluster of symmetrical bayonet-suggesting, bluish-green leaves, its stalk of flowers attains a height of from five to fifteen feet, when it will support literally hundreds of waxy, cream-colored blossoms. Sometimes these enchanting flowers will dominate a whole hillside, making a quite wonderful spectacle.

The yucca, though, has more than beauty to recommend it. Fibers from its long wiry leaves have been used by natives for many centuries in making ropes and weaving nets, bags, and baskets, the leaves themselves being converted into sandals and mats.

Several varieties, such as the *Yucca baccatas,* are highly prized by both Indians and Mexicans on account of the saponaceous qualities of their roots. Macerated, the root makes an ideal soap, specially recommended for washing delicate fabrics and woolens.

The way certain insects assist plants in the perpetuation of their species by carrying pollen from the anthers to the stigma in the blossoms, is well known to nature students. With some plants, apparently, it is impossible for them to perfect their seeds without this assistance. And the fact that the very insect needed appears, year after year, just in the nick of time, seems nothing less than a miracle; but perhaps that

Photograph by McCulloch Bros.

YUCCA IN BLOSSOM.

is what a miracle is, the never commonplace workings of the amazing laws of nature.

No plant I know of receives more necessary or remarkable aid than does the yucca of the foothills. About a week before the creamy white blossoms open, unfailingly the Pronuba moth crawls out of its tiny burrow in the ground, and as soon as the yucca petals unfold, quite as if she knew what her great destiny in life was, she spreads her wings, white above and brown underneath, flies to the creamy chalice, takes the golden meal from the swaying anthers and moving swiftly to another flower, pushes her little ball of pollen into the tube extending from the stigma down through the pistil where, working to the ovule, its presence causes the seeds to develop.

Is this a work of great unselfishness on the part of Mrs. Moth? It is not. Little she cares for the yucca's posterity; it is her own children that concern her! She wants the seeds to grow so her infants, which, by the way, she will never have the pleasure of beholding, will have the proper sort of baby food. You see, when her work of pollinizing the flower is over, she bores into the seed pod and lays her eggs.

A week later the eggs become larvae, when they feed upon yucca seed for about four weeks more. At the end of that period they bore their way out, and, as humble worms, find nothing more to their liking to do than to each spin a silken cord and by its use descend to the ground, where they crawl around a bit, eat, encase themselves in their little cocoons and as pupae remain dormant until another year rolls around, when, becoming moths again, the Pronuba life cycle has made another revolution.

It seems a rather monotonous sort of an existence to an

outsider, but perhaps the moths find certain periods of it, when first entering the palace of the yucca blossom, for example, quite exciting.

The sotols, *Dasylirion,* somewhat resemble certain varieties of the yucca, growing in very large rosette-like clumps. The flower stalk, though, is less branched, and presents quite a different appearance.

The agáve common in the Southwest is a smaller relative of the usual "century" plant found in northern botanical gardens, and also of the large Mexican variety whose sap at certain periods of growth is easily converted into *pulque,* that beverage dear to the palate of the peon.

As is well known, the agáve grows in large rosettes resting on the ground; but its leaves instead of being flexible like the yucca's are stiff and thick, terminating in a sharp thorn.

In spite of its popular name, the agáve's life cycle terminates in a much shorter time than a century. After a few to many seasons, on a warm spring day when its reservoir of sap is all but overflowing, from the center of the rosette a vigorous stalk pushes itself upward with amazing rapidity, growing under favorable circumstances as much as a foot a day, until at eight or ten feet or more, it develops a wonderful cluster of big yellow flowers—the whole effect of the plant being that of a great candelabrum which one might fancy was set burning before some god of the open air.

Differing again from certain varieties of the yucca, which may bloom for many seasons, the agáve blossoms but once, exhausting all its resources in that single tremendous floral growth.

A favorite dish with Indian tribes for many generations was made by taking the central stems of agáves when nearly

matured, and, with the attached leaf bases, roasting them in a pit, the necessary temperature being attained with hot stones. After cooking for twenty-four hours or longer the agáve sections are reduced to a sticky, stringy, sweetish product, appetizing apparently to the educated taste, and containing considerable nourishment.

Distilled, this concoction is called mescal, a drink long a close rival of whisky as a popular firewater both with Mexican laborers and Indians. The Apaches made a particularly devilish drink guaranteed after a few doses to turn a peaceful and taciturn aborigine into a howling maniac.

In altitude the foothill country varies from twelve hundred feet above sea level, where it leaves the desert, up to a mile where the high plateau begins.

As a traveler motors northward from Phœnix or Tucson over one of the excellent highways characteristic of the Southwest, while the road will be continually slanting, first upward then down, on the whole it ever takes one to higher levels, the vegetation steadily changing with the height.

Palo verde and ironwood trees, salt and creosote bushes disappear almost at the desert floor. The tall sahuaros stay with him for a time, occasionally appearing in a veritable forest on the steep slopes, then they, too, begin to drop behind. Mesquite trees, though, are still seen, and, at about three thousand feet, cat claw and hackberry trees will put in an appearance.

If his road cuts across a well-watered draw he may catch a glimpse of sycamore trees and wild grapes. The grapes, by the way, will follow the washes well above a mile high, where they will be joined by walnut trees. Along river beds

all through deserts, foothills and lower mountains majestic cottonwood trees will dominate the view.

Between four and five thousand feet, in favorable localities scrub oak will begin to appear, and on north slopes, a few cedars, or junipers—both names being used to designate the same tree.

Then at last our traveler comes to a long hill whose crest is the rim of the high plateau, and when he has reached the top he will find his whole world is startlingly different—different in temperature, in quality of the air, in vegetation and in scenery.

To illustrate the change one finds at different levels I may tell of a motor trip I took one spring from Chandler, in its oasis in the desert country in southern Arizona, to Long Valley on the Mogollon plateau.

It was in the middle of May, and, in our oasis, summer was well advanced. In many fields two crops of alfalfa had been cut and apricots and figs would soon be ripe. We drove over the Apache Trail to Roosevelt Lake where the weather was very much the same as it had been at home. Northward we went to a little farm at the Goodfellow Natural Bridge. Here it was late spring, perceptibly cooler than the desert. From there we drove a few miles further along a steadily ascending grade to the village of Pine, nestling at the foot of the great Mogollon cliff, where we found that the calendar had been turned back to early spring, with the apple trees just getting into blossom. Up the steep incline that cuts the mighty escarpment climbed our car, taking us two thousand feet nearer the sky. When we reached the top we found ourselves at the edge of a forest of pine and, behold, it was late winter, cold enough for

overcoats. There were no new leaves anywhere in sight, and the only hint that spring might be expected some time in an uncertain future was given by the blossoms of some venturesome sego lilies that shiveringly had pushed their way through the pine needles on the forest floor.

This plateau country of the Southwest, lying north of the Mogollon Rim and extending eastward from Seligman, on the Santa Fe railroad, to practically the east line of New Mexico, in different localities presents many aspects of plant life. Here again, elevation is the major influence in determining the species, though air currents diverted by mountain ranges, also are a contributing cause.

There are many broad spaces where one may motor for many miles without a tree in sight. There will be a great area where the only ground covering is dotted bunches of coarse galleta grass. Then perhaps this will change to a long sweep of sage brush; these treeless sections are apt to be in lower and dryer spots of the high plain.

If you are driving your car eastward from Ash Fork, as you ascend the long slope toward Flagstaff first cedars will appear, then, at about six thousand feet elevation, there will be pines. Once past Flagstaff, with the San Francisco peaks well behind your left shoulder, the road will dip downward until again you come into cedars, and by the time you have passed Winslow the landscape is almost treeless again.

In journeying across the Southwest on the interstate automobile highways there are always mountains in sight, some of those on the northern route lifting their heads above timber line. Yet even in the case of the tallest of the ranges, as viewed from the distance, lying low against the skyline, they do not at all impress one with a sense of height. One reason

Photograph by McCulloch Bros.

AT THE EDGE OF A SOUTHWESTERN FOREST—The Southwest has the largest yellow pine forest in America. Many good roads traverse it.

for this is that the observer himself is a mile or more above sea level, and a second reason, owing to the clearness of the air, a mountain always seems nearer than it is, its actual considerable distance naturally flattening its apparent altitude.

However, when one drives directly through the mountains themselves the aspect is often wholly different. Occasionally the rise of a mountain is so gradual that a highway crossing it is simply a succession of ascending hills on one side and descending ones on the other. Oftener the scenery will be most spectacular. Perhaps the road will gain its ascent by cutting a line up a canyon wall. There will be towering crags above one, and below, a great basin where, looking down, the traveler views a green sea of tree tops. At every turn of the winding road, now rising, now falling, one is greeted by an ever-varying but always inspiring view that at times rises to the very heights of sublimity and grandeur.

After a time, as such things will, the beauty of the scene as a whole begins to be taken for granted, forming a background in the mind, while one's immediate interest is attracted to such things as bushes and flowers, shrubs and trees near at hand.

For one whose previous conception of the Southwest is a place solely of cacti and creosote bushes, it will be difficult to realize that he is still in the same country. Here he may drive his car for a hundred or two hundred miles and be almost continuously surrounded with such trees as junipers, pines and firs.

There are ten varieties of pines in the Southwest, the one oftenest seen being the yellow pine, *Pinus ponderosa scopulorium,* which is to say the "Great pine among the

rocks." It is a splendid-looking tree, rising to a height of from 125 to 140 feet. It makes wonderful lumber, soft and easy to work, and valuable for both inside and outside purposes. Remarkable as it may seem, the Southwest possesses the largest yellow pine forest in America.

The Apache pine is interesting to the naturalist on account of its rarity, it being found but seldom in any place save southeastern Arizona. The Chihuahua pine is also found in southeastern Arizona, and, as well in southwestern New Mexico, extending south across the International border.

Nut pines are abundant in both Arizona and New Mexico, and include three varieties—the Mexican piñon, the *Pinus edulis* and the single-leaf pine. The trees are smaller than the regular pines and all have short needles. The meats found in the cones furnish a food that has been highly prized by native races for hundreds of generations. Indeed it is still considered a delicacy not only by Mexicans and Indians but by whites as well.

Squirrels and other rodents are as fond of piñon nuts as are humans, and quite unwittingly the wood rats extend their services in helping the Indians harvest the crop. The rats gather the nuts and heap them in their storehouses, and then the Indians come along and loot the nuttery.

Altogether there are six varieties of junipers to be found in the uplands of the Southwest. Besides appearing in groves at lower levels, they also grow as isolated trees on the flat plains, and among other trees on mountain slopes where they may be found as high as eight thousand feet.

Most of the junipers growing in groves are unsymmetrical, with trunks often branching at or near the ground. The smallest variety, the dwarf *communis,* is but little more than a shrub, not over five feet high. The largest of the junipers,

however, the *pachyphloea,* when situated in a favorable location, and not crowded by other growths, will make a noble-looking, wide-spreading tree fifty to sixty-five feet high, with a trunk four to six feet in diameter.

All of the junipers are long lived, some attaining an age of eight hundred years. The value of the wood for such purposes as boxes, chests, pencils and fence posts is well known.

The Arizona cypress is found in the mountain regions of the state from which it derives its name, extending its range down into Mexico. It is a tall, beautiful tree with a straight trunk and symmetrical crown. A quite remarkable thing about it is the way it can adjust itself to different elevations; though found in its natural state at from forty-five hundred to eight thousand feet, transplanted it is used as a lawn tree in the desert level at Tucson, and on the Pacific coast.

The Engleman and the blue spruce are found on the high mountain slopes in the upper border of the pines. Quite as tall as the yellow pine, with their blue-green needles, and draped as they often are with gray-green lichen, they present a particularly noble appearance.

Another attractive conifer growing at about the same elevation is the silver fir. Its foliage is a particularly lovely shade of blue-green blending into silver.

But of all of the trees of the high mountains, none quite so thoroughly excites our admiration as the quaking aspens. Their slender white trunks and ever trembling pale green leaves give a virginal effect, and in some way remind one of a débutante of colonial days dressed in rustling silk for her first ball.

In high, moist, shadowy canyons grow ash and maple

trees, and with them may be found blackberry, gooseberry and even raspberry bushes. On the slopes above, likely enough, there will grow manzanita bushes, which with their glossy brown bark and their attractive blossoms and berries are perhaps the handsomest of all the mountain shrubs.

Summer rains in the highlands begin soon after the first of July, and if one goes exploring in August, in places where soil, light and drainage are favorable there will be found grasses and flowers in abundance, and, if one knows just where to look for them, ferns as well.

Grasses of one kind or another grow all the way from three thousand to eight thousand feet above sea level. From the stockman's point of view, grama and mesquite take first rank. Then there are blue-stem grasses, tripleawn grasses, drop seed grasses, and, at high altitudes, mountain bunch and wheat grasses. Sacaton, and more especially galleta grass, are found growing over large areas, but are eaten by stock only when the shoots are young and tender. Alfilerilla, called by the cowboy, "fillaree" is a famous forage plant bearing a tiny purplish-pink blossom.

When I come to write of the mountain flowers of the Southwest I find it difficult to paint a picture that will adequately show just what these upland gardens look like. Sometimes in a treeless section there will be acres sprinkled over with little points of color, usually some shade of red or blue. Sometimes it will be a hilltop dotted with the little scarlet flames of the Indian paintbrushes. Perhaps a little basin will be filled with violet or purple iris, or a canyon wall half covered, it would seem, with golden and cardinal columbines.

They are like a lot of children with their different per-

sonalities: one bold, another shy; some dressed in the gaudiest of colors, others as sober as little Quakeresses. I would like to describe them with some detail, but there is room here only for a list. Still, do not run over the names as you would in a seed catalogue. Make a little picture of each plant as you come to it. Think of the perkiness of the owl's clover, the gaiety of the monkey faces, the sweetness of the wild rose, the shyness of the wood violets. Read the list lovingly and you will find your reward as you go along.

There will be painted cups, beard tongues, gilias or skyrockets, wild fuchsias, bouvardias and a lobelia, all of which will have bright scarlet or red flowers. There are painted cups, tall blue larkspurs, lupines and irises, evening primroses, fairy dusters, orange- and red-flowered milk weeds, golden glow and occasional patches of Perry's yellow lily, besides honeysuckles, spiræas and a host of smaller flowers like geraniums, primroses, shooting stars, wild peas and vetches, bluebells, buttercups, lady slippers and many another orchid.

It has already been told how the sego lily is the herald of the spring. The glory of the autumn is the goldenrod. And one must not forget the ferns. Ferns in a desert country? Yes, indeed; there are ferns that inhabit the most arid and uninviting rocky foothills; there are other varieties that grow in ponds and, quite as one would expect, ferns will nearly always be found among the maples, firs or spruces of the high mountains. Among the fifty or more varieties that abide in the Southwest there are some that grow only a few inches tall, and there are others the tops of whose vigorous fronds come up breast high on a man and occasionally even reach above his head.

BEASTS, BIRDS AND A FEW BUGS

CHAPTER XXVII

GAME ANIMALS AND THEIR HUNTERS

HE peoples of both Arizona and New Mexico highly value the wild-game life of their states and through stringent protective laws administered by zealous and conscientious game wardens much is being done to preserve and increase it.

Naturally here as elsewhere are to be found those who, given the opportunity, are deterred neither by consideration for law nor the ethics of sportsmanship in their slaughter of wild life. Public opinion in the Southwest, however, has little sympathy with the game hog, and state protective associations, gun clubs and individual sportsmen coöperate with officials in enforcing both the spirit and letter of the law.

A very great aid in this protective work is the number of bird and game refuges that have been established. In all these no-hunting zones the count of both birds and game animals is steadily increasing.

The game laws of both states make the obtaining of a license a prerequisite of hunting. In Arizona it is unlawful at any time to take or possess any antelope, elk, goat, mountain sheep, female deer or fawn, road runner, bob white, grouse, guinea fowl or pheasant. New Mexico adds to this prohibited list, ptarmigan, beaver, buffalo, Sonoran deer, swan, prairie chicken and sage hen.

Predatory animals not protected in either state include mountain lions, bears, wolves, coyotes, wildcats, lynxes, foxes, leopards, and skunks.

Song birds are protected at all times, but English sparrows may be killed as well as the great horned owl and all species of hawks.

Game food fish may be caught with hook and line attached to a rod held in the hand.

The largest of the deer found in the Southwest are the mule-deer, the bucks weighing occasionally up to 300 pounds or more, though most of them will run from 150 to 250 pounds. The smaller of these deer are known locally as black-tail. Naturalists, however, insist they are only small "mules," and that there are no real black-tails in Arizona or New Mexico.

The summer coats of the mule-deer are red or gray brown; in winter they are steel gray. They like the open spaces as well as the woods, and while found in many places in the Southwest they are by far the most numerous on the Kaibab Plateau in Arizona north of the Grand Canyon.

The greatest natural enemy of the deer is the mountain lion, which used to be very plentiful in this region. For years, however, the hunters of the Biological Survey have waged unremitting warfare upon the beasts, until now there is only a small fraction of their original number left. With the lessening of the lions there has been a corresponding increase of the deer. Although it is almost impossible to induce the mule-deer to breed in captivity, in favorable localities in the wilds, if unmolested by enemies, they are very prolific, the does often giving birth to two, and occasionally three fawns at a time. In the Kaibab country they

Photograph by Albert Schlechten

AN INQUIRING DOE ON A SNOWY MORNING—Deer thrive amazingly in many parts of the Southwest when protected. Local game laws allow restricted hunting of bucks for one month.

evidently find living wholly to their liking for they have increased there until now the herd is estimated at all the way from thirty to forty thousand head.

The Virginia or white-tail deer is found in fewer numbers in many different locations of the wilds of the Southwest. While often found in mule-deer habitats they are shyer animals than the mule-deer, usually keeping to the woods and shadowy canyons.

Considerably smaller than the Virginia white-tail, is the Sonoran deer occasionally seen along the Blue River in Arizona and in different places in New Mexico. It is a dainty, beautiful little creature, seldom weighing more than seventy-five pounds.

Forest rangers report that in the various forest reserves in Arizona there are about 50,000 deer of which 30,000 are in the Kaibab. In New Mexico they estimate the number of deer at 20,000.

Elk at different times have been brought into the Southwest where they have steadily increased. The forest rangers' count for New Mexico is about 75 or 80. In Arizona the total count is estimated at something over 800. The Sitgreaves elk are a good deal of a nuisance to the farmers of that region.

Especially prized by lovers of wild game in the Southwest are the bands of big-horn mountain sheep and antelope which, in spite of ruthless slaughter in times past, still inhabit remote sections of the country.

There are perhaps from eight hundred to one thousand big-horns in the two states. They are more numerous in wilder parts of the desert mountains in southwestern Arizona. The rangers estimate that there are also about eighty in the

Photo by courtesy Biological Survey, G. W. Russ, Photographer

ELK—After being exterminated in the Southwest by hunters, a small band was imported into the region in 1913, where they have been slowly increasing.

Coronado forests, three in Crook, twelve in Tonto. In New Mexico there are about 150, all in the Lincoln forest.

A dozen years ago many naturalists feared that by this time antelope would be practically extinct in the wilds of the United States; instead, owing to the protection given them in western states, they seem to be slowly increasing. One important item that has aided in their preservation is a change the animals are making in their habits. Speaking of this, Will C. Barnes, assistant forester, says: "Taking the National Forest states as a whole, antelope show an increase over previous years, part of which is due to migrations of these animals from the lower, open ranges which always previously have been used by them into the higher mountain regions. This migration of the antelope is a complete change in their ordinary life-habit. In the early days when they were more plentiful, they were seldom seen in the mountains, preferring the open plain country. With the occupation of these feeding grounds by local stock the antelope have been forced into the higher timbered area."

In the entire United States there are believed now to be something over 30,000 head. The foresters believe there are about 1800 head in Arizona, and 711 in New Mexico.

There is still grave danger in spite of the protection they now receive that both the big-horns and the antelope may become extinct.

Nature, taking infinite pains, has spent millions of years in bringing our game animals to their present unique perfection. They have a part in the tradition of our country; they are identified with its earliest history; they belong here and inspire all who chance upon them in their remote retreats —in wind-swept uplands or high mountain peaks—with a

Photograph by courtesy Biological Survey

WILD MOUNTAIN SHEEP—Once plentiful throughout the mountains of the Southwest, the remnants of the bands are barely holding their own, though protected by a continuous closed season.

new appreciation of the gods of the out-of-doors. It will be not only an irreparable loss to the Southwest but an everlasting reproach to all who live there if they are permitted to die out.

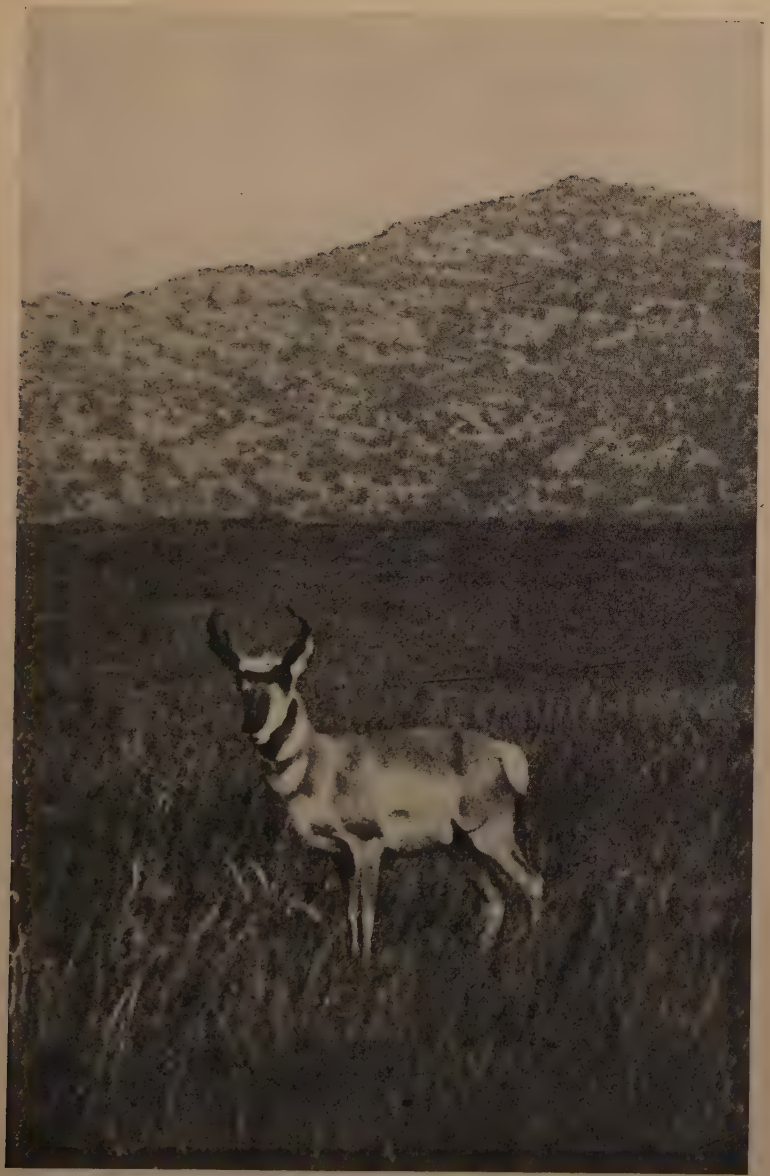
As all naturalists and most big game hunters know, the bears usually designated as the black bear and the cinnamon bear are the same species, breeding together, and that of the two cubs usually constituting the litter one may be black and the other brown, just as an ewe may give birth to either a black or white lamb, or one child of a human mother may be a brunette and the next a blonde.

These interesting beasts, who never harm a man unless cornered, are still found in limited numbers in various wilder parts of the mountain regions of both Arizona and New Mexico, such as the Mogollon Rim country, though they have been hunted so vigorously by men of the Biological Survey and others that the number is steadily decreasing. There may be 1200 or more bear in Arizona and about half that number in New Mexico.

There are a few grizzlies in New Mexico—perhaps a score —and about the same number reported for Arizona,

Running on the open range in House Rock Valley, in Arizona north of the Grand Canyon, are about seventy-five head of bison belonging to the state.

The approved way to hunt mountain lions is to go after them with hounds. If you have good luck, and your dogs pick up a fresh trail, after you have followed them on your cow pony, up one canyon and down another, loping your horse when there is opportunity, slipping and sliding over rocks and bowlders, there will finally come to your ears the sounds of yelping, indicating that the dogs have brought



Photograph by courtesy Biological Survey

ANTELOPE—All but exterminated by ruthless hunters, a few bands of these shy creatures are perhaps slowly increasing in the Southwest, where they are protected by a continuous closed season and watched by game wardens, who are backed by growing public sentiment.

their quarry to bay. When you arrive upon the scene the big cat may be up a juniper tree or crouched on a pinnacle of rock, with the excited hounds below.

You have been told beforehand that the cougar is a good

Photograph by McCulloch Bros.

ARIZONA BUFFALO—Part of a herd belonging to the State of Arizona, ranging north of the Grand Canyon.

deal of a coward and never attacks a man, but as this one glares at you from his perch, growling and working his claws, you wonder if his accredited lack of bravery hasn't been overrated, and you speculate as to just how far he could jump in your direction if he really tried.

Though mountain lions are slow to attack a man they never show any reticence about going after stock, and will kill a yearling colt or cow with but little more difficulty than a cat will a mouse. Leaping to the shoulders of his prey, he will bury one of his claws in its nose and twist the head about in a way that will usually break the animal's neck.

M. G. Gusman, one of the hunters of the U. S. Biological Survey, in the summer of 1926 killed a mountain lion at the head of Lime Greek, Arizona, that, it was estimated, had cost the stockmen of the state $14,300, besides depriving the

Photograph by courtesy Biological Survey

The result of three days hunting by a Government man in the Apache National Forest, Arizona.

state of more than $350 in taxes that would have been collected on cattle killed by the beast.

The lion was twelve years old, which gave him eleven years of killing. In making the estimate of the damage done by him, the Biological hunters had reason to know that he killed at least one animal a week, worth probably twenty-five dol-

lars. Often the number was considerably higher. One night, for instance, out of sheer wanton bloodthirstiness he killed sixteen ewes, all heavy with lamb, worth twenty dollars apiece. Among saddle horses he killed one worth $150 and another, $125. The lion when killed measured from his nose to the tip of his tail eight feet, and he weighed 175 pounds. In eight years the government hunters have taken six hundred lions in Arizona alone.

An added thrill to a lion hunt is given by seeing a couple of cowboys rope and tie one of the beasts. Naturally not all cowboys are up to the stunt, but there are those who have done it more than once.

The reddish-gray lynxes of the Southwest, commonly called wildcats or bobcats, are found both in the deserts and mountains. In the deserts, except in midwinter, their coats have a rather moth-eaten appearance. In the mountains they are much sleeker.

They are good hunters, for the most part living on such small animals as rabbits or ground squirrels. They also have a nice appreciation for chickens and turkeys, and have been also known to do damage to sheep and goats.

In spite of their reputation as fighters, they never attack humans, and when taken young become likable, if rather uncertain pets. Now there was Cleopatra, adopted as a kitten by the leading garage man of our town. Unstinted in viands she grew not only fatter but rather larger than her cousins in the open. Her head was broad, her expression usually mild, her manners elegant and her voice a deep contralto. Altogether with her thick glossy coat and graceful ways she was a beautiful lady.

Her owner kept her in the sales room, and while as a pre-

cautionary measure she was tethered by a long, light chain, she had pretty much all of the room to run about in, and would play with the garage men quite as friendly as would an ordinary house cat.

Photograph by courtesy Biological Survey

BOBCAT—Trapped but defiant.

One day a dog, just an average sort of a dog, of good size and aggressive disposition, who was in the habit of bullying cats, chanced into the room, and seeing Cleo asleep on her favorite box, gave a challenging yelp.

Cleo opened her sleepy eyes. She could hardly credit her senses. A dog trying to intimidate her! The canine's bark grew sharper and he moved aggressively forward.

Her ladyship made a face, spit and jumped dogward. Attack merged into retreat in the twinkling of an eye. The dog leaped for safety none too soon. As it was, Cleo got one claw into the edge of his hide, just as her chain halted her.

The garage men estimated that if the dog kept up the gait he struck upon leaving the shop, he would reach the California border, a trifling matter of a couple of hundred miles, in about an hour and a half.

The trinity of the high gods of the Pima-Papago pantheon are Jewerta Makai, the Earth Magician; See-a-hoo, Elder Brother, and Coyote, the astute and cunning child of the sun and moon.

As we all know, after the waters of the Flood subsided, these three met to create for the second time men, beasts and birds to inhabit the earth. Each in his mind had determined upon certain changes, as the first batch had not turned out very well.

When they had reached their rendezvous the three sat down, their backs to each other, and each, with a lump of moist clay in front of him, started in with his modeling.

The Earth Magician, being himself a sort of super-Pima, decided he could do no better than to make his men a good deal like himself. Elder Brother, in his haste to make some people that would be superior to those of Jewerta Makai, scratched one of his fingers, causing it to bleed copiously. The blood stained the clay and, as a result, his creatures became the cruel Apaches.

El Coyote was considered to be a bit lower in the social scale than the other two, so to him was left the job of making the beasts and birds, with the left-overs to be turned loose as reptiles. Somewhat of the same mind as the Earth Magician, Coyote started in by making one beast largely in his own image, and naturally having a special affection for him, endowed him with his personal cunning, which attribute the mortal coyote has to this day.

Photograph by J. E. Gillis, courtesy Biological Survey

DON COYOTE in custody for killing quail, sheep and calves.

The Pimas still think him quite the shrewdest beast of all, smarter even than the pack rat or the desert fox. The ranchers also think him shrewd, but do not love him for this quality. He robs their chicken yards and picks up straying turkeys; he makes nocturnal visits to their melon patches, and, not satisfied with eating one or two to satisfy a frugivorous hankering, will bite into a half dozen or more cantaloupes or water melons to the agriculturist's natural exasperation.

The coyote is particularly pestiferous to the sheep herder. One will camp on the trail of a band of sheep indefinitely, and woe to the sheep or lamb that strays from the rest of the herd and the protection of the herder and his dogs. A lamb may be killed and wholly devoured in a time no longer than it takes a man to consume a couple of doughnuts in a quick-lunch stand.

If the ranges are poor and the cattle weak, two or three coyotes may catch an enfeebled mother away from the rest of the herd and rob her of her calf, or snapping at her from under her belly, kill her as well. However, if her bellowings reach the ears of nearby cows, they run wildly to her rescue, and with lowered heads and threatening mien present a front that usually sends the coyotes off discomfited.

Still, to the agriculturist, he is really more of a blessing than a pest. All rodents lay toll upon crops, and the coyote is a perpetual enemy of these hungry little pilferers.

We have spoken of Don Coyote's fondness for melons. Away from the haunts of man he will vary a carniverous diet with gourds, cactus fruit and other desert and mountain growths. Ground squirrels he digs out of their holes and gobbles with small ceremony. Pack rats he will pick up in

their runways, but is seldom able to storm their nests, so well are they placed in crevices between rocks, or, in the open, guarded by cactus joints or defended too strongly in their construction of well-placed twigs.

Courtesy Biological Survey

Coyotes in this neighborhood became altogether too plentiful—Biological Survey hunters reduced the count.

There are no gray wolves that are permanent residents of the Southwest. Occasionally a few stray up from Mexico or come south from Colorado to Utah but they do not tarry long. Against no species of predatory animals do the hunters of the Biological Survey wage a more relentless war. They go after a wolf with trap, poison bait and gun, and it usually is not a great while before they get him.

Although these hunters kill a good many coyotes, as well, there always seem to be plenty of them left.

As naturalists have often observed, the skunk is an illustrious example of one who achieves through a highly devel-

oped specialization. The deer is very fleet, the bear has great strength, the wildcat can either fight or climb a tree, yet all three species are dwindling in number while the skunk, relying on his unique specialty, more than holds his own.

Photograph by courtesy Biological Survey

THE END OF "THREE-TOES"—A notorious wolf whose life was a succession of bold and bloody raids upon cattle and sheep.

Newspaper correspondents in France during the World War proclaimed poison gas as a new element in warfare. They forget that skunks demonstrated the efficacy of this sort of a thing before the dawn of human history. The skunk is small, yet with this, his devastating weapon, he will successfully defend himself against antagonists of any size. Scorning Fabian tactics, if the occasion seems to demand it,

he will jocundly attack anything that walks on legs, and the swifter they are the faster they flee.

At that he is no bully. Unless he believes that one with whom he comes in contact has an unkindly attitude toward him he does not bring his artillery into action. Still, it must be confessed that experience has taught him to doubt the pacific intent of most everyone, and when in doubt he shoots.

That at heart skunks are really amiable is indicated by the fact that when taken young and shown that certain humans really have kindly feelings toward them, the amiability is fully reciprocated.

The small daughter of a mountain neighbor of ours adopted a family of five small motherless skunks and successfully raised them. The little skunks had a home of their own selecting under our neighbor's house and, realizing the obligations of hospitality, never did anything to make it odoriferous. Mother skunks call their young by patting their feet on the ground. Small June, the mistress of the skunks, patted her hands on the firm earth by her back doorstep by way of telling her charges that their bread and milk or table scraps were ready for them.

Only once was there an unfortunate occurrence. One night June's father came home rather late and accidentally stepped on one in the dark. A latent instinct promptly awoke in the outraged kitten. It was a sad moment for father, and brings to mind the classically brief but graphic letter which the town boy wrote to his mother on his first visit to his country cousin. "Bob and I dug out a badger yesterday. It was a skunk. We slept in the barn."

One occasionally hears stories about hydrophobia skunks,

as though there were a sub-species of them, whose bite inevitably conveyed rabies. Of course this is incorrect. Skunks, like coyotes, dogs and certain other animals, in exceptional instances, become infected with rabies and pass

Photograph by courtesy Biological Survey

A five-point bull elk in early winter.

it on to other animals and even humans by biting. In my forty years' residence in the Southwest I have never personally known any one so bitten.

Peccaries, or wild hogs, are occasionally seen in Southern Arizona and New Mexico, straying north from Chihuahua and Sonora.

CHAPTER XXVIII

BIRDS AND FISHES

HEN I go into a strange locality one of the first things I do is to become acquainted with the birds. It is a habit I like to recommend to others. Knowing birds adds so much to the fun of living; they are such engaging, friendly creatures. And just as one gets more sport out of watching a ball game if he can individualize the players, so birds are infinitely more interesting if one knows who's who among them.

Besides the birds who stay the year around in a certain locality, there are both summer and winter visitants and migrants. In the Southwest some of them, after spending the winter in the warm desert country, go north for the summer; even more of them reach cooler weather by the easy expedient of flying up to the mountains which, from any part of the lowlands, they can reach in a few hours. Other birds who like the hot weather, or the fruits or seeds or insects that appear in that season, stay in the desert country during the summer, going down into Mexico or Central America in winter.

It gives one a feeling of good-fellowship to recognize the different sorts of birds as they make their first seasonal appearance or, if one is on a camping trip, it's fun to be able to identify the birds by their calls as one after another pipes up in the morning.

It is even more interesting to take time enough to study the personalities of the birds about one's yard or ranch; to learn that certain sorts are exclusively bug-eaters, that others care only for seeds and the tender buds of plants, while still others eat almost anything they can find in the way of food. It is wholly intriguing to observe the sort of nest each species makes, and to wonder what the inner promptings are that incite the various broods to go about the business of building just as their particular parents did, back for no one knows how many generations. Do they suspect that nature has decided for them in advance what they are going to do, or do they think they are making up the plan themselves as they go along?

It is fun to watch them in their courtships, to see the males strut and preen before the admiring ladies. And it is wholly fascinating to observe the vicissitudes of their married lives; the way they train their children, and their relations with other sorts of birds.

But if you do desire to know birds, do not, I beg of you, make their acquaintance in a pedantic way, to be improving your mind, but rather for the joy of it—for the love of all things out-of-doors.

In writing about the birds of the Southwest my plan is not to take up space by telling of unusual birds that are seldom seen, but instead, to mention the most noteworthy of those that, in season, one is apt to observe frequently in his yard or as he walks or drives about the country.

The most numerous family of birds, both on the desert and in the towns of our section, as is the case in many other places, is the sparrow. And you need not think that all the sparrows are the same sort as that noisy, unmusical, pugna-

cious nuisance that drives other birds away, the English sparrow. It is unfortunately true that he is, in towns, always the most conspicuous member, but altogether, in desert and cultivated districts, there are upwards of fifteen varieties of sparrows in the Southwest, many of them with not only gentle habits but with charming voices.

A special friend of mine is the big Gambel sparrow, with his striped black-and-white head and his pleasant call, who frequents villages as well as farms, and makes it plain to the English sparrow that he still stand no nonsense from him. He spends the winter in the warm deserts, going north in the summer.

The western lark sparrow is another big member of the family not infrequently seen. He has characteristic white, black and chestnut markings. He will summer in the mountains up to seven thousand feet. The little Brewer, the western vesper, the desert and other song sparrows, all have pleasant voices and tuneful songs. I wish I had more space to talk about them.

We have all noticed that usually when Mother Nature bestows upon a bird the gift of song she tells him that he will do well to be satisfied with a plain coat; that the conspicuousness a gay tunic coupled with a fine voice could give, might easily turn a bird's head. However, when she came to the western cardinal she evidently decided to take a chance. Perhaps in a previous incarnation the cardinal was neither tuneful nor colorful and she wanted to make it up to him. In any event she gave him all there was.

He is a delight. His plumage is a red flame of joy and his song a fountain of bubbling laughter. A big bird and rather shy, he does not care much for towns out our way,

but in a garden in the suburbs, like that beautiful sequestered one of the San Marcos at Chandler, or among the orange trees and palms in Castle Hot Springs canyon, or in a grove of alamos at a foothill ranch, he will become quite tame. He stays in the foothills more or less the year around, but in the hotter parts of the desert he disappears during midsummer.

The Arizona pyrrhuloxia, about nine inches long, is a most distinguished looking relative of the cardinal who makes his home in southern Arizona, usually staying rather close to the Mexican border. He wears a gray coat with artistic red trimmings. He has a parrotlike bill and that, together with his exotic markings and a habit of raising and lowering his crest, which he seems to do in lieu of shrugging his shoulders, certainly gives him a foreign air.

Quite as good looking as the cardinals or pyrrhuloxias are the orioles. Three varieties are found in the Southwest, the Scott, the Arizona and the Bullock. They are all summer visitants, the Scott keeping to the foothills and mountains, the other two usually to the Lower Sonoran or desert zone. Apparently realizing that their brilliant yellow uniforms, with their dark markings, make them dangerously prominent, they spend their leisure hours more or less in tree tops where they blend with the yellow of the sunshine and the shadows of the leaves in a wonderfully self-effacing way. Casual observers get more pleasure out of their presence than do the owners of peach or fig trees as their robust appetite for fruit rather tends to restrain any glow of hospitality a horticulturist might otherwise feel when, on a bright morning in May, Jolly Jack Oriole drops into his orchard bringing with him all his brothers and sisters, their cousins and wives.

The phainopepla, seven inches long, in his elegant black

and white raiment, looks every inch an aristocrat. He has a crest if not an escutcheon, and a pleasant if not an elaborate song. A resident of the desert, he wanders up into the foothills on summer vacations, and is fond of viewing the world from the topmost branch of the highest tree in his neighborhood.

The lark is a particularly joyous bird. Did you ever notice the gold medal pinned to his breast—right under his chin? That was awarded for unfailing cheeriness under all possible circumstances. Most of the winter through, before the other birds have started in on their courting songs of spring, the lark is on hand greeting the morning sun with his clear call. As is well known, he feeds and nests on the ground, and does the farmer distinct service by devouring quantities of insects.

Although many people, especially those who live east of the Rockies, have never even heard of them, of all the birds of America in my opinion, the threshers of the Southwest are the finest vocalists. They are about the size of the mocker, a little longer, not quite so slim, and although grayish in color have not the white bars on the wings. On account of this casual resemblance they are sometimes called Sonoran mocking birds, but surprising as it may appear to those who have not heard them, they are far better singers than the real mocker. The trouble with the mocker is, he is just a bit too versatile, often interrupting his sweetest arias with bars of the commonplace. The thresher's song is always pure enchantment. He sings only of love and springtime, and his song, a glorious pouring forth of music that will go on for a half hour perhaps, is as colorful as a solo of Melba or Calvé.

There are four varieties of threshers here, the Palmer, Bendire, Leconte and Crissal.

The Leconte, the lightest in color of any of the family, is for the most part a pale brownish gray, blending perfectly with the color of the earthen floor of the desert. He is very shy, slipping through the bushes like a shadow and is seldom seen. The Palmer, gray-brown above and grayish below, is much bolder, making himself at home in the cottonwood trees on ranches, or in the villages in the cultivated sections. It is he and the Bendire who have the finest songs.

If I have spoken slightingly of the mocker, let me redeem myself by giving him proper tribute. He is a rollicking beggar, and like many another wandering minstrel in the Southwest, while he considers the Lower Sonoran zone his more permanent residence, he wanders over much of the highlands in the summer. I have heard the mocker's gipsy song in the hot Gila River bottom, almost in duet with the threshers, and again on that road of the sky between Gallup and Zuñi trying to teach the piñon jays of the high forests something about vocalization. These happy vocalists are always joy bringers, whether in countryside or town, whether gladdening the dwellers of a foothill cabin or supplying orchestration for moonlight lawn parties in Phœnix.

When living in the desert in winter, or in the mountains in summer, the first bird you will hear in the morning often will be one of the flycatcher family, whose eerie notes always have a plaintive touch of melancholy, which certainly belies their actions later in the day. When they are hunting they are about the busiest looking creatures in the world, darting about looking for flying insects over a pool or an irrigating ditch. They will overtake and gobble up a dragon fly or a

moth on the wing apparently as easily as many another bird takes his insect asleep at the end of a grass blade.

One brilliantly plumaged member of the family is the vermilion flycatcher, whose entire underparts and showy crest are bright scarlet.

Kingbirds are particularly belligerent members of the flycatcher family, ready to fight anything that flies, from an English sparrow to a hawk. When one is unable to start trouble outside of his own family he seems to have just as good a time fighting with brothers and cousins.

They like hot weather as well as warm quarrels, and appear in the desert country in April where they stay until cool days of late fall. The Arkansas kingbird is seldom seen as high as five thousand feet, while the Cassin will occasionally wander two thousand feet above the mile level.

If you are camping in the mountains and there are any blue jays about you will soon know it. They arrive at dawn and stay till dark, and have no trouble at all in making themselves feel at home. Calling, squalling, quarreling, if given half a chance they will forage upon your garbage pail, rob your commissary, and some among them are even not above taking bacon from a frying pan, if it isn't too hot.

The Southwestern highlands specialize in five different varieties of these birds, the long-crested jay, the Woodhouse, the Arizona, the Rocky Mountain and the piñon. The long-crested fellow is the best looking. His head and crest are glossy black, the rest of him blue with a dab of white above the eyes. This is the only jay we have besides the Steller with a crest, and he maintains his dignity by being a bit more retiring than the other species.

The Woodhouse has a head of dull black, with a white

line above the eyes, a bluish back, and underparts of gray. He likes the scrub-oak country. The Rocky Mountain chap has a head nearly all white and is generally a lighter looking bird than the long-crested and the Woodhouse. He prefers the high mountains and is the most impudent of any of the self-invited feathered visitors at your camp. All the jays but the piñon more or less deserve their reputation for killing small birds and robbing nests of eggs and young.

The piñon jay is generally a gray-blue with a darker head and with faint white streaks on the throat. He is shaped more like a crow than a typical jay, and when he can get them, as his name indicates, feeds on piñon nuts, varying this with grasshoppers and other large insects. Gregarious in habit, outside of the mating season these birds are seen in flocks of various sizes throughout the mountains of the Southwest, but are more plentiful in New Mexico than in Arizona.

There are no birds of the Lower Sonoran zone that more vividly bring to mind a background of an alfalfa field as the irrigator turns his broad stream of water into it, than do the red-winged black birds. How they love to splash and splatter in the water, and how cheery is their famous call—"O-ka-lee-ah! O-ka-lee!"

The yellow-headed blackbirds are even more striking in their looks than the red-wings, but their atrocious voices! Their vocal efforts sound like a mingling of Guinea hens clattering with the croaking of frogs down with tonsilitis. The yellow-heads nest in the tule swamps along rivers, visiting the alfalfa fields of the Colorado, Gila and Salt River valleys, but are seen much less frequently than are the red-wings.

Hummingbirds make their homes throughout the South-

west, from the hot deserts to the highest mountains. Of the eighteen species listed in the United States, fourteen have been seen in the Southwest.

The Costa, with a back of metallic green, nearly white underparts and a beautiful amethyst-colored gorget, is a winter resident both among the blossoming trees and cacti of the desert and among flowering plants of adjoining cultivated sections. Very friendly, there is a pair of them that for three springs have made their nest among the vines on the high ceiling of the San Marcos arcade at Chandler, Arizona, and have reared their families quite unmindful of the many people who pass directly beneath their tiny abode.

A variety often observed in the mountains up to eight thousand feet is the broad-tailed hummer, who is quite stunning in a gorget of rose-purple.

A friendly bird of the mountains that is rarely seen below four or five thousand feet altitude is the western evening grossbeak. A good-looking bird he is, about the size of an oriole, with yellow, black and white markings, and may easily be identified by his large bill. He is a neighborly creature and in woodsy suburbs may nest quite close to one's house where his peculiarly sweet song will endear him to any bird lover.

Another mountain bird that everybody loves on account of his friendly habits as well as for his wonderful song, is the canyon wren. I once rejoiced in a rustic study among the pines near Prescott, Arizona. Upon arriving for the summer on an early June day, I found that a pair of canyon wrens had entered the room through a hole in the gable drilled by an industrious woodpecker, and had built a nest upon a beam just above my typewriter desk. Not only that, but Mrs. Wren

had already deposited four eggs in it. Wholly undisturbed by the clatter of my typewriter, the lady hatched all four eggs and reared her brood.

On aviation day, however, when the birdlings left their nest for their first flying lesson, they made so much more noise than I did, all four peeping away at the tops of their voices, that, leaving the screen door open, I watched proceedings from the outside.

An hour's practice, jumping from beam to beam in the study, seemed to satisfy the proud parents that their hopefuls were ready for the world outside. A signal was given and promptly the youngsters, fluttering a bit wildly, but on the whole quite proficient, followed dad and mother through the open door.

Three weeks later, apparently having their precocious family quite off their minds, back the parents came, Dad Canyon Wren bursting ecstatically into song from one of the beams.

Again there was a season of laying and hatching and five featherless squallers lay in the nest. If only the young couple hadn't been so ambitious! If they had just tried to raise *two* more. The trouble was that the bug crop was getting short. And what appetites the little beggars had! All day long both parents would fly back and forth bringing in succulent insects. Upon arriving at the nest they would make a peculiar call, the babies would open their mouths and, presto, one at least would have his lively meal.

Then, when another week would have brought them all to flying size, the food supply vanished almost entirely. Of such things are tragedies made! I watched the anxious parents busily search among the rocks outside with but

meager success. Longer and longer they would remain away. Finally one afternoon they gave up the attempt and did not return at all.

Appreciating that it was a matter of life or death with the youngsters, all the members of our human family tried to tempt them with tiny pieces of meat, gravely imitating, the best we could, the parental signal for them to open their mouths. Our failure was one hundred per cent complete. I put the fledglings on the rocks outside, where they died.

Ten days later I was taking an afternoon siesta in the study when through the woodpecker's hole came the mother bird. As I lay very still watching her, she went directly to the nest, which was a very large one, made of sticks, much grass and moss and lined with feathers. Upon reaching it she attacked it savagely with her bill. Then taking sections of it at a time she flew with them to a beam where, shaking her head violently, she tossed the pieces in bits to the floor. Back and forth from the nest to different beams she flew until the nest was entirely obliterated and the litter actually covered half the floor. Then she flew out the familiar entrance and never returned.

The smallest owl in the world is found in southern Arizona. This is the elf, a tiny creature no larger than an English sparrow, that nests in old woodpecker holes in the giant cacti. Strictly nocturnal, it feeds on large insects and less frequently on small birds. The sahuaro screech owl, one and one-half inches longer than the elf, also occupies abandoned woodpecker holes in the big cacti.

The owl of the Southwest most often seen is the burrowing owl, which nests in the holes of the badger, ground-squirrel or prairie dog, and stands at the mouth of his burrow blink-

ing at you. He blends so well with the bare brownish-gray soil that usually you do not see him. There is an old story that the owl, the prairie dog and the rattlesnake will all live peacefully together in the same burrow. Mere nature fiction; as naturalists have often observed. If the owl and the prairie dog should be together, the owl would eat the rodent; if a rattlesnake and an owl should find themselves in each other's company the snake would eat the owl.

The largest owl in our country is the western horned one, eighteen to twenty inches long, and strong and fierce enough to kill a skunk, which he finds especially appetizing as an article of food. He also kills and eats poultry, various birds, rabbits and other small animals. Altogether there are nine different sorts of owls to be found in the Southwest, and as they kill many rodents their presence has a definitely economic value.

The bird that will most firmly fix itself upon the mind of the average traveler in the desert during the summer months as the most conspicuous, might easily be the buzzard. Seen on the ground at close range he is repulsive enough, but once in the air, as he soars up into the blue, he commands the admiration of all who watch him. How untiringly he flies! As long as one may gaze at him, spiraling overhead, one will never see a sign of awkward exertion. There will be a little lift of the wing as he banks for a turn, a little change of his feathered planes as he rises or falls, but always every movement will be the epitome of grace.

The hawk flies as easily as the buzzard but less untiringly. The business of the two birds in the air is quite different. The buzzard is looking for carrion; the hawk is hunting live game. When the telescopic eyes of the latter sight his quarry

—a field mouse, a ground squirrel, an unwary snipe, like a spear cast by some hunting goddess of the air, he hurtles down, and when he rises he usually carries his luckless victim with him.

Many people seem to think that the paramount object in the lives of all hawks is to steal chickens from farmers, and therefore they should be shot on sight. This is a grievous error. Most hawks, by reason of the number of rodents they kill, are among the farmers' best friends. Many of them never molest poultry at all, and the man with a gun should early learn to discriminate between the husbandman's friends and foes.

The bluish-looking ones are apt to be the barnyard raiders. One of the worst of these is the Cooper hawk, only sixteen inches long, small as compared to the red-tail which measures twenty-one. The Cooper is bluish gray above, with his underparts barred in white and rusty red. The sharp-shinned hawk, which is four inches shorter than the Cooper and similarly marked, is also a chicken raider. While he kills some field mice he devours small birds as well. The pigeon hawk, fortunately not often seen in the Southwest, is likewise an undesirable citizen of the air, preying upon small birds. He is bluish above, white throated, with the rest of his underparts tawny.

Among the hawks decidedly beneficial to farmers are the western red-tail, often a sooty brown with lighter breast; the Swainson, twenty-two inches long, gray-brown above, whitish below, with a broad band across his breast; the rough-legged hawk, with upper parts of a dusky shade mixed with rusty brown, and the Harris, which is mostly sooty brown with a black tail, the tip and base of which are white.

In general it may be said that hawks that show red feathers on the shoulder or tail are apt to be the farmers' friends.

Hawks and falcons together, there are a dozen varieties that are common in the Southwest, the smallest being the desert sparrow hawk, ten to thirteen inches long, the largest the rough-leg and the western red-tail, twenty-four inches long.

The ospreys, twenty-five inches long, are sometimes thought by casual observers to be small eagles. They are seen on high cliffs overlooking such bodies of water as Canyon Lake in the Superstition Mountains. They are dusky brown above, whitish below, with a head mostly white. They make a wonderful picture as, from a poised spot high in the air, with suddenly closed wings they dive downward for fish.

Unquestionably the most remarkable bird of the Southwest is the road-runner, or chaparral cock. He is a slim brownish creature, with certain of his feathers a steel blue. He is as rangy as a game cock and a little over half its size, and sports a rakish-looking topknot, which he raises and lowers as the spirit moves him. The wing power of the road-runner is but little better than the leghorn's, but any one who has seen him run would readily decide that, considering his leg action, flying would be a superfluous accomplishment.

He will run along the road ahead of one's car at a speed that will almost equal a coyote's, and only take to his wings when closely pursued or to reach the limb of a tree or other not-too-high eminence. In broken country he will use his wings in jumping from a high rock or in airplaning across deep arroyos.

His food in the meat line embraces lizards, including the

horned ones, ground squirrels, desert rats and mice, grasshoppers, centipedes and other insects. In a vegetarian way he has a nice taste for cactus fruit and squawberries. He is also accused of rivaling the coyote in a willingness to rob a quail's nest, especially if the eggs are about ready to hatch.

In expressing his emotions the road-runner has quite a voice. This rogue of a bird who always looks ready for almost any sort of mischief, actually coos! Not exactly like a dove, but not wholly dissimilarly after all. "Coo, oo, ah-oo!" you will hear him call during mating time, and then to show that he appreciates the joke in it, he starts snapping his bill together, with a noise quite unlike any other bird sound in the world.

There is a hoary old campfire story to the effect that whenever a road-runner finds a rattlesnake asleep on the desert he will build a fence of joints of the cholla cactus about the reptile. When the snake awakens, inasmuch as he cannot cross the barrier, and seeing that escape is impossible, he will bite himself and die.

A good rule to follow concerning stories one hears in the desert country is this: if it sounds like the truth—if it is too plausible—listen warily, there may be a joker concealed in it somewhere. On the other hand if it seems to bear earmarks of pure fiction hold your incredulity in leash—it may be true after all.

In this case, however, the story may be set down as pure romance. In the first place a rattlesnake will loop himself over a joint of cholla cactus, just as he will over a hair rope which has long been supposed to be an impassable barrier to snakes, with the greatest ease. Secondly, if a road-runner ever found a rattlesnake asleep, why in the world would he

want to waste time in building a fence around him? He would tap him about twice on the head with his rapierlike beak and the snake's slumbers would be lengthened into infinity.

My friend Sunny Jim, a prospector, who has lived on the desert many years and has a wholly incorrigible habit of truthtelling, says that on two different occasions he has seen road-runners vanquish rattlesnakes in a very different way. The road-runner grasped the snake by the rattles on his tail, dragged him tail-end over the ground so rapidly that the snake became wholly bewildered, then dropping the tail, before the snake had time to regain his faculties, with his bill he administered a *coup de grace* as dexterously as a matador.

While in many localities in California where the road-runner formerly was quite numerous he is now seldom seen, in his favorite haunts in Arizona and New Mexico, such as along the lower Gila, Salt and Rio Grande he is still fairly numerous. Occasionally, too, he is encountered in the mountains, a mile high or more. Usually while one is observed alone it is not at all uncommon for them to go about in pairs.

The great golden eagles of the Southwest, as far back as tribal legends run, have been held in profound veneration by native races. Captured in their nests when young, the birds were held in sacred captivity in the villages of the cliff dwellers and in other prehistoric pueblos for feathers to be used in ceremonials and for adornment.

Historic as well as prehistoric Indians considered them more than mere birds. So strong were they in their flight, so high could they pierce the empyreal blue, that surely,

they argued, they must reach the very abode of the gods. To-day, with some such thought as this in mind, the Hopi priest sacrifices an eagle in solemn ceremony, believing that released from his physical body the great bird's spirit will carry the petitions of the dwellers of the high mesas to the greater heights of Those Above.

All who know him consider the golden eagle a much more noble bird than the one chosen to typify our nation. The bald-headed eagle feeds largely on fish and does not object to carrion. The golden eagle disdains to eat anything not freshly killed.

No one ever suggests that the golden bird is a pacifist. He is not only frankly a fighter, but frankly predatory. As a preliminary to his dinner he slays, unless, as in a scene I once witnessed, he can rob another killer. It was in wild, broken country near Tonto Basin, in Arizona. From a position on a hillside I observed a golden eagle swoop with tremendous momentum to the floor of the valley below. A moment after he had touched the earth I noticed a wildcat back away from the point of impact.

Looking through a pair of field glasses I saw that the cat had killed a full-grown sheep, and was feasting upon him when the eagle, taking in the situation, had decided to argue rights of possession with him.

The sheep, however, was far too heavy for the eagle to carry. He flapped his wings and transported the carcass a few yards when he was obliged to drop it. The cat, seemingly aware that the eagle would have to circle before he could return to the sheep, darted back to his kill and fastened his teeth into the sheep's flesh.

However, in a minute or two back swooped the eagle,

when the cat, manifestly intimidated by the terrifying mien of the big bird as well as by his murderous claws and beak, backed snarlingly away—the snarl registering perfectly through the glasses—his attitude, arched back and a retaliatory raised forepaw, showing quite as much rage as fear.

Again the eagle tried to carry the sheep and again he failed, giving the cat another minute of feasting. Three times the action was repeated, when the cat, spurred to greater boldness by fear of losing his prey, with claws dug into the ground, hung on to a hind leg, while the eagle pulled at a fore quarter. In the tug of war the carcass parted. The eagle immediately carried off his portion to the top of a butte nearby, but seeing the cat dragging away what was left of the sheep, with royal greed swooped down again to rob the cat of that piece, too.

But the cat was too quick for him, for by that time the outraged feline had pulled his piece into a crevice between two high bowlders where the eagle could not reach him, and with back again arched and teeth showing, he spat at the eagle in a transport of rage and defiance. With a grand sweeping gesture of the wings, as much as to say that after all the cat might keep his piece as a "tip" for the excellent service he had given in serving the meal, the big bird departed.

The "golden" eagle is really a blackish brown, with gold-brown feathers on the back of the neck and on the flanks. The males are thirty-six inches in length, with the females a trifle larger. They make their nests in high trees or on ledges on inaccessible cliffs. Two or three eggs a season are all the mothers lay.

In the Southwest these noble-looking raptores of the high skies are seen only in sequestered mountains in New Mexico and eastern Arizona. Bald eagles seldom enter the region.

The pretty topknotted Gambel quail, which look much like the California valley quail, are well distributed throughout the Sonoran and Transition zones of the Southwest, though more plentiful in the well-watered sections of the lower desert country. They are intriguing creatures. Often, when feeding, one of their number will perch himself in a tree or upon a post and act as sentry. This always seems to be a wise old bird who, in this country where Spain so rubs elbows with America, gives his warnings bi-linguistically. "*Cuidado!*" he calls, should a dog poke his nose through the arrow brush; but when a man, following with a gun, comes into sight, forgetting the more deliberate language of Castile, he excitedly adds, "Git! Git! Git!"

The scaled quail is bluish gray in color, with a white or buff topknot and derives its name from the scalelike marking of his feathers. He is about the same size as the Gambel and is found in the foothills of southeastern Arizona and southern New Mexico. This variety is not nearly so plentiful as the Gambel.

It is a rather sad commentary upon human nature that we call the Mearns the "fool quail" for the reason that he has an ineradicable faith in mankind, refusing to be frightened at the sight of an advancing hunter. Friendly as a hound pup, I regret to say he pays for his confidence by being frequently transformed from a quail in the brush to quail on toast. The markings on his face suggest a circus makeup. Poor little clown quails that get slapped! They are found in sequestered places in the foothills and mountains in limited

numbers. If they do not change their confiding disposition I am afraid they will soon go the way of the dodo.

There are five species of doves or pigeons found in the Southwest. The most widely distributed of these is the western mourning dove, which is found in both the Sonoran and the Transition zones. Feeding largely in stubble fields or upon weed seeds, they are more often seen in the cultivated sections than in the wilds, and are much more abundant in the lowlands than the highlands. Still one finds a good many of them on the deserts, in river bottoms and mountain canyons. They are twelve inches long, fly very swiftly and have a noticeably pointed tail.

The white-winged doves are about the same length but heavier than the mourners. They winter in Mexico, and in May appear in the warm valleys of southern Arizona where they stay through the hottest weather. They lay a rather heavy toll upon farmers' grain fields, but as they are very good eating, hunters keep them from getting too numerous. Indeed, for the last few years they have been hunted so industriously that they are growing decidedly scarcer. In the early fall, as soon as the hot weather begins to abate, some bright morning Mr. White-wing will say to his wife: "My dear, do you realize that the thermometer only reached ninety-eight yesterday? We'd better be going south. This chilly weather is getting quite uncomfortable."

The Inca dove is about two-thirds as big as the mourner. Common throughout much of Mexico and Central America, his habitat extends into the Lower Sonoran zone in the Southwest. He is a good-looking little bird, a grayish light-brown with feathers marked with a darker edge suggesting scales. His tail is long but less pointed than the mourner.

If you sleep too late in the morning he calls "Slow-poke!" to you.

The Mexican ground dove looks much like the Inca, only his tail is shorter and is cut nearly square at the end, also the scale markings on the breast are a little less sharply defined.

Both the Incas and the ground doves become very friendly, haunting dooryards and feeding on the ground almost as tame as chickens.

The band-tailed pigeon is a mountain bird of the Southwest, and not very often seen even there. He is fourteen inches long and shaped much like the domestic pigeon. In the fall and winter he depends largely upon acorns for food.

DUCKS

In spite of its many square miles of dry deserts and arid upland plains, both Arizona and New Mexico are good "duck countries." In the cultivated sections along the Salt, Gila, Colorado, Rio Grande, Pecos and other rivers there are many thousands of acres in grain and alfalfa, which are, in season, lures not only to large flocks of ducks but more rarely to brant and geese as well.

Of later years, since the farmers in some of these sections have substituted cotton for wheat and barley in many of their fields, the number of visiting game birds has somewhat diminished. To offset this, new irrigation systems already initiated will, within the next few years, add from two to three hundred thousand acres more of cultivated land to the present area. Under the Coolidge reservoir on the Gila, 50,000 acres that will be farmed by Indians will probably be largely devoted to wheat and alfalfa. This will again increase the local duck count.

As it is with other birds, certain species of ducks spend their winters in the lowland country, going north for the summer. Others spend their summers in the higher mountains. A few stay in the lower valleys much of the year. The gadwalls breed and also nest in these lower valleys, and while a few remain during the winter most of them leave before the shooting begins, October 16th. Blue-wing teal appear early in this region, usually coming in August, but leave again about October first. Cinnamon teal arrive in March and leave about June first. Mallards and sprig-tails like the cooler weather, arriving in the [1] Lower Sonoran zone about December first and staying until early in March. Widgeons come about October fifteenth and leave the middle of March. Redheads and scaup ducks and a very few canvas-backs are also winter visitants, coming up from the Gulf of California. The merganser, which lives exclusively on fish, breeds in both the Upper and Lower Sonoran zones, remaining in the country more or less the year through. Quite a few mallards and some other varieties breed about lakes and streams in the upper Sonoran and Transition zones of Ari-

[1] Naturalists divide the Southwest, as other places, into zones according to climate, which usually means elevation modified by such minor considerations as, in the mountains, whether a slope has a sunny or shady exposure. In the Southwest the warmest zone is the Lower Sonoran, lying in the hot deserts of southern and western Arizona and along the lower Rio Grande and Pecos in New Mexico. The next cooler is the Upper Sonoran, which extends through the foothills up to the high plateau country where sage-brush and cedars grow. Still higher is the Transition zone, with a maximum altitude of from 7500 to over 9000 feet. Here are found yellow pines and deciduous oaks. The zone next above this is the Canadian, all of it higher than 8500 feet above sea level, home of the Douglas spruce and white fir. The only zone above this in the Southwest is the Hudsonian, which includes the tops of the San Francisco peaks and the crests of the Sangre de Cristos. In the mountain tops of the latter range, at the very edge of the timber line are found three denizens of the Arctics—strange creatures to be living in this latitude—the whistling marmot, the little rabbit-eared cony and the ptarmigan.

Photograph by McCulloch Bros.

WHERE TROUT TAKE THEIR SIESTA—A stretch of quiet water on a mountain stream.

zona and New Mexico. A few Canadian geese and black brant are occasional visitors in colder weather in all parts of the Southwest where there is water and attractive food. More rarely a white swan will be seen during the winter months.

FISHES

It is always a matter of surprise to the uninformed to learn the amount of good fishing there is in the Southwest. There are many streams in the higher wooded sections of northern New Mexico and Arizona, all of which are kept well stocked with trout from hatcheries under the direction of game wardens. In one year there were distributed in New Mexico nearly three million trout to fifty-one streams or lakes in that state; and in Arizona, a half million trout to fourteen streams or lakes.

Especially well-known trout streams in Arizona are the White and Black Rivers, and in New Mexico many streams on the upper watershed of the Rio Grande and the Pecos.

Bass and other fish are numerous in the steadily increasing number of artificial lakes used as parts of irrigation systems along the Salt, Gila, Rio Grande and Pecos Rivers. Perch as well as bass are caught in high-altitude lakes such as Lake Mary, nine miles south of Flagstaff; Mormon Lake, sixteen miles south of Lake Mary, and many other lakes in northern New Mexico.

CHAPTER XXIX

POISONOUS CREATURES

EXCLUDING bootleggers, who are rather outside the scope of this book, the prominent poisonous creatures of the Southwest include centipedes, scorpions, tarantulas, Gila monsters and rattlesnakes.

It seems to be the impression of many visitors that as soon as one gets into the deserts or mountains these members of the poison squad hide in ambush behind every rock or cactus ready to spring out and without warning or provocation sink their stings or fangs into one. To put it mildly these reports are quite unreliable. The poisonous ones neither lie in wait for the traveler nor track him down: on the contrary they are usually more inclined to flee from the human than the human is to get away from them, and it is well authenticated that of the two the human is far the more deadly.

Centipedes look evil enough but are not specially dangerous to adult humans. They have a retiring disposition and usually to be seen must be hunted for. Underneath a boulder in the open, or under an old board in a cellar are likely places to find them. Down in the desert country they are usually to be seen must be hunted for. Underneath a bowlder specimens from eight to ten inches long are seen. Although tradition is to the contrary, not all of the centipede's feet carry venom, the poison glands being confined to the front pair of legs. Nor are they always ready to attack one.

I once saw a centipede drop from a tent ceiling on a man's bare shoulder without inflicting a sting. When a friend of mine, thrusting his hand into a bag, was stung he said the pain was but little worse than a wasp's sting. He promptly applied ammonia, and except that it hurt considerably for twenty-four hours or thereabouts he suffered no ill after-effects.

A scorpion is much quicker in action than the centipede. He carries a lance in the end of his abdomen and can throw it over his back and strike with a movement almost as quick as a rattlesnake's. While the sting to an adult seems no more severe than that administered by a centipede, with children of three or less, if proper remedial treatment is not immediately given, it is sometimes fatal.

Perhaps the most repulsive-looking of all the invertebrates in the Southwest is the big spider known as the tarantula. Legs included, he is about as big or bigger than the palm of a man's hand, and his hairy brownish-black covering suggests the unshaven stubble on the face of the hobo of the vaudeville stage.

All spiders secrete some poison in their jaws. Laboratory experiments have shown that a large tarantula may have poison enough in him at one time to kill twenty mice. I have heard of only two or three instances where humans have been bitten. In one case, where a man was bitten in the hand, the arm was somewhat swollen to the shoulder, the pain was rather severe for two or three days and complete recovery was not attained for a week.

A number of other insects of the Southwest, which are accounted poisonous by certain local traditions, are quite harmless. One of these is the praying mantis, known to the

Mexican laborers as the "campomocha." It is their belief that if one should be accidentally swallowed by a horse or cow the beast would immediately die.

The whip scorpion, more commonly found in Texas and old Mexico than in the Southwest, is another insect falsely accused of poisonous propensities. When disturbed it emits a secretion whose odor suggests vinegar, and for this reason is called a "vinegarone."

A cousin to the spider family is the little solpugid, about an inch or so long, with a big head, four pointed jaws, ten legs and an abdomen that suggests a section of a caterpillar. Although it, too, is entirely harmless to humans, the Mexicans, who call it *mata venado* (kill deer), consider it quite deadly. The only creatures that might rationally fear the solpugids are ants and other small insects, upon which they prey. The solpugids, too, are sometimes called vinegarones.

There are eleven different sorts of rattlesnakes in the Southwest, of varying colors and sizes all the way from the diamond-backs, which have been known to attain the length of from six or seven feet, down to the little grayish horned rattlers, known locally as side-winders, which are two to two and one-half feet long.

When alarmed, the first impulse of any of the snakes, except the side-winder, is to assume a defensive attitude, to manifest agitation or anger by a shrill vibrating sound from the rattles, and prepare to strike; just as an old-time frontiersman, when startled, might close his fingers around the handle of his gun.

For all his well-earned reputation as the most dangerous of all American reptiles, a rattlesnake is one of the easiest

creatures in the world for a man to defend himself against. To strike effectively he must coil, and the distance he can strike from a coiled position is definitely limited. For this reason a coiled snake can be dispatched with a minimum of danger by a man armed with stones or a long enough stick or club.

The side-winder, however, is an exception to all rules. Just as in going about he does not content himself with merely gliding as do other snakes, but will travel in an oblique direction by throwing his body in a looping motion, so he will strike by the simple process of arching his neck, and he doesn't give much of a warning in the way of rattling. Also at variance with the habit of the average rattler in remaining in one spot and arguing the matter with you, the side-winder is perfectly capable of coming directly at you.

In appearance the head of the side-winder, with its scales, nubby horns, beady eyes, forked tongue and long fangs, would do very well for a representation of the Prince of Evil, and there is nothing that I ever discovered about him that would suggest that his nature belied his appearance.

A queer thing about the side-winder is that though found on the hottest deserts, the direct rays of the sun on an average day in summer will kill him in ten, or even five minutes; so during the day he keeps to the shade and does his hunting at night. Kangaroo rats and pocket mice are important items in his menu.

Although there are still plenty of rattlers in sequestered places in the Southwest, one might camp in the open for a year and not see one. They hibernate during the winter and usually, with the possible exception of the side-winder, are as anxious to keep away from humans as the average

human is to avoid them. As for the risk of a camper being bitten by one, it is considerably more remote than the chances of a casual visitor to one of our large cities being shot by a "gunman."

A favorable place to find a rattlesnake, if one really wants to see one in the wilds, is a desert mesquite thicket. There will be a good many ground squirrels there to eat the mesquite beans and, not unlikely, plenty of rattlesnakes to keep down the ground squirrel census count.

So when in desert thickets mind your step, or if climbing up a cliff, never under any circumstances put your hand up on a rocky ledge above your head where you can't see. And if you aren't a Hopi snake dancer or a road-runner don't try to see how familiar you can be with a rattlesnake. Within rigid limits one might chum with a Gila monster, but with a rattler—never.

The procedure to be followed if a person is struck is now well known. The wound is usually in the hand or arm, foot or leg, when a ligature should be immediately placed above it, but should be loosened as often as every twenty minutes lest mortification be induced. Immediately after applying the ligature, cut across the wound each way about an inch, and deeper than the fangs have penetrated. Potassium permanganate should always be carried in camp supplies in the summer, and after thoroughly bleeding the wound it should be washed with that chemical mixed with sufficient water to produce a deep wine color. If no water is obtainable mix with saliva or use dry. There is no danger in sucking the wound if one has no abrasions in the lips or mouth.

Two other poisonous snakes that on rare occasions are

seen in the deserts of the Southwest are the annulated and the Sonoran coral. The latter snake is found in central and southern Arizona. It is seldom above two feet long, with black, yellow and red bands encircling the body, the black always being bordered on both sides with yellow.

The annulated is occasionally seen down toward the Mexican border. It is about two and one-half feet long, and does not strike like the rattler as the fangs are so far back in the mouth that in order to emit poison its victim must be seized with the jaws.

The only lizard in the Southwest that is poisonous is the Gila monster and even he does not deserve half the unkind things that are said about him. It is often intimated that he is as deadly as a rattlesnake and even more aggressive. This is wholly an error. He never attacks humans nor shows a desire to bite them.

He moves over the ground slowly with a twisting movement of his body, deliberate in the planting of his feet which look uncannily like small hands. A man walking can easily keep up with him. In spite of the sluggishness of most of his movements and his comparative docility, in encounters with other animals he can turn end about and snap at an offender with the celerity of a bull terrier.

He has no fangs like a rattler, his poison glands being in his chin, and he releases the secretion but slowly; nevertheless when he once sets his teeth into the flesh of an adversary, he holds on with a vicelike grip until the lacerated flesh becomes thoroughly impregnated with the poison. With this in mind it is well not to try to pick up a monster by the tail, though I once did see a man pick up one by a fore leg without being bitten.

In size Gila monsters run from fourteen to twenty inches in length. Their skin suggests the rough surface of a bead-work purse, and is marked in characteristic patterns in salmon pink and black.

In captivity sometimes they refuse to eat for days at a time, when they seem to live off the substance in their fat tails, which steadily grow more slender. Their favorite food is raw eggs. I have seen one break the end of a hen's egg, tip it up daintily with its fore feet and suck it clean.

The monster hibernates in the winter, burying himself in the sand. In summer the female uses the sand to cover the six to thirteen eggs which she will lay in July or August.

A neighbor's boy in a southern Arizona town had one he kept in a wire cage. Every day he would let it out for exercise, easily keeping it from straying by gently guiding it with a stick. He would trickle water out of a bottle for it to drink, and on hot days the "monster" would turn up his face to the dropping water, drinking it and licking his lips with evident satisfaction. He never offered to attack the boy or showed any evidence of temper.

One sometimes hears stories of humans who have died from Gila monster bites, but Prof. Chas. T. Vorhies, professor of entomology at the University of Arizona, who has made an exhaustive study of desert poisonous creatures, has been unable to find a record of an authenticated case.

Although the technic of the monster differs so vastly from that of a rattler, my friend, old Rab the prospector, once witnessed an encounter between one of the big lizards and a diamond-back that proved the monster to be a most formidable antagonist. Trudging through San Tan Canyon near the Gila River, his attention was arrested by the angry

whirr of a rattler. A few steps farther and he saw a rattlesnake, about three feet long, held through the middle by the jaws of a good sized monster. The snake was writhing violently in an ineffectual effort to free himself, from time to time raising his head and striking at the lizard, which by marvelously rapid twisting would often elude the thrust. At other times the snake would be too quick for him and the deadly fangs would pierce the beaded coat.

For a half hour, perhaps, they fought thus, the snake steadily growing weaker and his thrusts feebler and fewer. The Gila monster's body finally became rigid but his jaws never loosened. There could be but one end; grim Death reached out a bony hand and claimed them both.

The only other lizard in the Southwest that approximates the Gila monster in size is the chuckwalla which sometimes attains a length of sixteen inches or so.

In his youth he is a dark olive color with darker spots or bars on his back, and as he grows older takes on the general color of a five-cent colorado-maduro cigar that has been retained in a pocket too long. He has a big, ungraceful looking brown head and a loose skin, and while he might be considered handsome by his immediate family this prejudice is not generally shared by outsiders.

In attempting to escape from an enemy he will drop down into a crack between rocks, just wide enough to admit him, and then inflate his skin so tightly that the only way a human can get him out is to puncture his side.

He is found more often west of the Colorado River than east of it, though I have seen a few of them in the Superstition Mountains. Unlike many lizards they are vegetarians.

The most beautiful reptile of the Southwest is the collar

lizard, whose skin is beautifully mottled in green and gold and who wears a collar of black, set off with a dash of scarlet. He can run with exceeding swiftness, and makes a very pretty object as he suns himself on a gray bowlder or darts with almost incredible speed among his native rocks. I have never seen one except in the mountains.

Horned lizards, or horned toads, as they are locally called, are found in the Southwest both in the desert and in the mountains. They are elliptical, flattened little reptiles about three or four inches long.

The head is edged at the rear with thorn-like horns and the skin of the back has little protuberances on it. Underneath the skin are pigment cells automatically controlled by nerves, causing them to assume a color that blends with the ground where the lizard then abides. I have seen them very light drab gray on the desert near the Gila River, quite a bright red on red sandstone buttes north of Salt River, and on granite ledges near Prescott so close a copy of the rocks upon which they were sunning themselves that they were almost unnoticeable. The skin of their bellies is white and makes one think of the under covering of a halibut.

At night or when too cold, or when it is too hot, they burrow into the sand and remain there until the temperature of the open air suits them. They live on flies and various other insects, being specially fond of ants. Raising themselves on their legs, they will stand at the edge of an ants' nest, and darting out their quick, viscid tongues, for many minutes will continuously transfer the insects to their mouths and stomachs alive!

I had long heard that they possessed the strange ability to shoot a tiny drop of blood from their eyes, but was inclined

to doubt it, until one I once held in my hand did that very thing. I suppose they do this in an attempt to frighten an enemy holding hostile intent toward them. I cannot imagine, though, such an exhibition having any effect upon the imagination of a road-runner, a rattler or a bull snake, which seem to be among their worst foes.

While to small insects the horned lizards must appear quite terrible sort of creatures, to the average human the little things seem rather pathetic. With all their absurd armament they are helpless in their endeavors to protect themselves against real enemies. Their only positive defenses are their ability to blend themselves into their background, and, with their chisel-like heads, to burrow into the sand.

Perfectly harmless to humans, I have often held one of the warm-blooded little creatures in the palm of my hand and "put it to sleep" by gently stroking its head until it closed its eyes.

I still remember my surprise at the sight of my first Agassiz desert land tortoise of the Southwest. There was I, among prickly pear and chollas, at the base of a gaunt butte miles from water, and there was the tortoise, almost at my feet, pottering about among the cacti. I was more than surprised, I was shocked. Tortoises belong in ponds, rivers and the sea, not on the desert! This one looked as incongruous in his surroundings as a horned lizard would in a goldfish's bowl, or a calf in a tree top.

Yet I learned that this tortoise is wholly at home on the dryest and hottest of deserts and if in captivity it is kept where it is too damp it will die. More numerous in the Mohave and the Colorado River deserts in California,

they are sparingly found all through southern Arizona where they are occasionally seen at the bases of small desert mountains and buttes. They hide in the rocks, hibernating during the winter and in the hot season in summer keep to the shade most of the day, feeding and wandering about early and late and perhaps much of the night, if there is a moon. They feed on desert herbage, which is scant enough except after the early spring and the rare summer showers.

In the spring they get some moisture from succulent plants. What they do for water the rest of the year is a good deal of a mystery. They must almost equal ground squirrels and desert mice in getting along without a fluid moistener.

In size the adults vary from eleven to fourteen inches long. Their defense against such natural enemies as the coyote or wildcat is complete. All one of them needs to do is to take in his head and pull his legs up under the eaves of his shell and he is safe at home—in an impregnable castle with the drawbridge up.

If an investigating coyote or cat should turn him on his back, he could never right himself, but this seems rarely if ever to happen, for capsized tortoises are almost never seen.

The Indians say they are very good eating, but in the economy of nature it seems a very prodigal thing to do to use a tortoise that might live to fifty or seventy-five or more years to provide a meal that is eaten in less than a half-hour. A chicken seems so much more logical.

George, the engineer's boy next door, has a desert tortoise which he keeps tethered on the lawn by a long, light chain attached to a small hole that pierces the edge of its shell. Its usual diet is grass, but it adores fresh figs. It is quite

harmless and unemotional to a degree. Perhaps it is its phlegmatic outlook upon life that is largely responsible for its longevity.

George's sister, who is studying British poets at high school, has named the chelonia, "Ariel." "It's a pun," she explained to me gravely. "Ariel, you know, was a nickname of Mr. P. B. Shelley, and there is certainly something very shelly about George's tortoise."

MARVELS AND SPECTACLES

Photograph from Putnam Studios

GRAND CANYON OF THE COLORADO RIVER, IN ARIZONA—Matchless in sublimity and grandeur among the scenic marvels of the world.

CHAPTER XXX

THE GRAND CANYON

AMONG the great natural spectacles of the Southwest, indeed of all the world, the Arizona Grand Canyon of the Colorado River is unique. In grandeur and awe-inspiring beauty, as in magnitude, it remains supreme.

So tremendous is the picture that our mental vision conjures as we try to tell about it that we pause, hesitant as a neophyte might before the altar of his god.

Words seem so inadequate. Masters of the brush and palette have given their highest talents in attempting to transfer something of its glories to canvas; musicians, red men and white, have sung great songs about it; poets have tried to record something of its magic in metrical verse; prose writers have employed every artifice known to their craft to tell its glories, yet all confess that it is a picture that will never be completely painted, a song that never will be wholly sung, a story that can never be quite told.

Perhaps we who try to make it come within the bounds of syntax and rhetoric should be the first to confess how far short our reproductions are of the reality. It is so difficult to be simple about it. Some way it seems as hard not to drop into dithyrambics in talking of the Canyon as it was for Ulysses to keep from jumping overboard when the sirens sang to him.

One trouble may be that after looking down from the

Rim into the depth for a while one is very apt to become absolutely intoxicated on form and color, and, in his delirium, quite forgetting that one of the purposes of description is to describe, begins to babble.

Perhaps as rational a way as we may choose to see the Canyon as it really is, is for us all to journey there together by motor and, leaving the town of Flagstaff on the Santa Fe some time after lunch, plan to arrive at the Rim just before sunset, when the glory of the view is at high tide.

It is August. The weather, as has been properly arranged for, is ideal. There have been preceding showery days to bring up the wild flowers, and to make it quite perfect let us say that there also has been a little spatter of rain that very morning, not enough to make the roads skiddy, but sufficient to rinse off the faces of rocks and trees and plants, bringing their colors to the last degree of perfection.

For two hours, then, we have been heading northward over a fine road. The late summer sky, that in a lower altitude is a pale and lovely turquoise, here, against an occasional cumulus cloud, is almost pure sapphire.

We have already left the San Francisco and Sunset peaks behind us. The ground is smooth and level. There are no violent breaks in the surface, no deep gulches nor buttes. Leaving the open plain we enter a forest. About are tall, somnolent pines, musical in a gentle wind. The view is like that of a rustic park with its absence of unkempt underbrush and its carpeting of wild flowers—Indian paint brushes, jewel flowers, larkspur and the like.

A squirrel crosses the road ahead and, scampering up a tree, from a convenient branch chatters at us amiably. It is a sylvan view. Nature is in the softest and quietest mood

imaginable, as though it were purposely supplying every artistic antithesis to make more impressive the scene we are so soon to gaze upon.

Suddenly, off ahead the earth seems to come to an end. Everything beyond is sky! Bill, the driver, who is also our guide, stops the car and says with what surely must have been a tone of exaggerated commonplace, "We are at Grand View. You can see better if you get out of the car."

We file out, and with an acute tingling sensation of expectancy, like a person might feel as he steps from an airplane for a parachute drop, we follow Bill to the edge of the cliff—and look! And as we keep on looking, with one accord the nerves centering in our various solar plexuses begin to pull together in knots, and our hearts start a tremendous pounding.

What is it we see? Steady! We can't quite tell for a minute; just a bewildering sensation of quite unutterable glories. The nice old lady who was with us, who reads her bible regularly, confessed afterward she half thought she was looking at a page from Revelation suddenly come true. Indeed, I think any of us, who in our youths had gone to Sunday school, would not have been a bit surprised if a flock of cherubim had come flying by with long silver trumpets at their lips.

The stockbroker, who stood by the guide, and who knows more about musical shows than about the old or new testament was heard to say that Belasco, Ziegfeld and Sid Grauman still had plenty to learn about stage effects.

Do I hear the gentle reader tugging at our sleeve reminding us that if we are really going to tell what the Canyon looks like and not rhapsodize, now would be a good time to

begin? Quite so! To be sure! Those sirens do have a seductive call!

You see it is the slanting rays of that golden sun that are playing the mischief with us. We are not looking across one single canyon, but a myriad of them. Instead of standing at the edge of a level plain we seem suddenly to have been transported to a mountain top in some magical land, and are looking down upon thousands of lower peaks, over which some capricious genie has spilled gorgeous dyes from scores of vials.

And the colors are not staying put! That's another thing that is making us feel so tingly. They are continually changing! It is the lowering sun again—changing shadows and mingling the dyes. Rose changes to crimson; mauve merges into blue; saffron turns to gold. They aren't just flat colors. They are luminous as jewels beneath electric lights!

And the forms that the endless vista of great rocks assume —pyramids, turrets, domes, towers, mosques, minarets; castles for giants, palaces for Titans! The Northman's Valhalla, the Greek's Olympus, the Mohammedan's Paradise are all spead out before us. At least so it must have seemed to those who gave them names and put them down in the guide books, for every mythology and religion in the world was drawn upon by their christeners. Confucius's Temple, Krishna's Shrine, Aztec Amphitheater, Wotan's Throne, Tower of Set, Angel's Gate, Dragon's Head, Huitzil Point, are but a few among many. Some way the thought intrudes that those who did the naming were almost too inclusive in the list. Surely a nomenclature more indigenous to our Southwest was possible.

Still we look! Time goes by. We have forgotten altogether such ephemeral things as minutes and hours. We don't say much—half inarticulate ejaculations compose our sentences—most of them mere inhalations of breath. When we do say anything it is much like lovers' talk, which sounds great at the time, but wouldn't be worth a nickel a thousand words if recorded for subsequent reading.

Finally we begin to arouse from our comatose condition and become exuberantly vocal, asking one another if he had seen this—and that—and that! Wonderful! Marvelous!

All the while the sun is sinking lower and lower, and shadows of deep smoky brown, purple and blue slowly creep up from the Tartarian depths below. And says Bill: "It's thirteen miles and a half along the Rim Road to El Tovar. We're pretty late for dinner right now!"

Nevertheless we wait and see the sun go down in gorgeous splendor; we see, too, the dyes of the canyon reproduce themselves in the cumulus clouds above, and the purple shadows climb up to our feet.

The stockbroker now comes to life. "By George, it *is* time for chow! This upland motoring gives a man some appetite."

One can't look at even Paradise forever—at least not in this life—with dinner waiting. We climb into the car; Bill steps on the gas and as we turn into the El Tovar road we try to tell each other what we really think about it.

The next morning we follow Bill, muleback, down Bright Angel trail and learn some of the details of the great gorge. As we see things at closer range we appreciate more than ever that the Canyon is not a single great chasm but a network of canyons all tributary to the central one, and that the myriad

peaks we saw from the Rim rise between those many awe-inspiring gulches.

The tremendous bigness of it all next begins to impress us. We notice a little bowlder below. When we come to it we see that it is as big as a cathedral. Below that there is a small cliff. It takes us a half hour to descend the trail that cuts across its face! The greatest of city parks could be dropped into a side pocket and never be seen. A fair-sized city might be lost in many of the gulches.

Bill tells us that the Canyon is thirteen miles across from the point where we left the Rim, though the average is only eight! He also mentions that the altitude at El Tovar is six thousand eight hundred and sixty-six feet above the sea, and that it is over a mile straight down to the river, and seven miles by trail.

While we stop at the rest station known as Indian Gardens the geologist in our party outlines for us the history of the rocks. Down at the bottom of the gorge is archaic gneiss, or granite, the stuff of which the world was originally made and upon whose great shoulders all subsequent buildings of earth and rock and sand were laid. He tells us that here from the very beginnings of things up to the world of to-day the chronology of the earth may be followed. He shows us marks of depressions and upheavals, of twisting and cleavage by the mighty forces of nature. He tells us of a time when a certain stratum lay deep under ancient seas, of another that formed the bottom of a shoal, of a third that may have been beach land.

The gneiss at the bottom of the gorge represents a page of time when there was no life whatever on earth; a stratum

a little higher suggests life's first appearance in the amœba. A still higher formation might have been the bottom of an ocean over which sea scorpions swam. Resting on that is a stratum that made the bed of a far later sea which was the home of primitive forms of fishes, and above that the deposits reaching quite to the top might mark land over which such strange creatures as the brontosaurus and the stegosaurus roamed. Here the record of the rocks abruptly ceases and the stop is most significant, for it indicates that above these rocks once had lain deposits accumulated for millions of years representing the close of the age of reptiles and the beginning and the continuance of the age of mammals. These deposits were doubtless thousands of feet in thickness and for the most part they were worn away by the eroding hand of time before the Canyon ever started, a job by the way, that took millions of years itself.

We continue down the trail to where a suspension bridge spans the river, and as we look at the sullen, swirling chocolate-colored flood below us, it is Bill, the guide, who becomes the teller of tales, relating with many exciting details stories of scientists and adventurers who have gone through the canyon in pygmy boats tossed by the treacherous flood, and battered and often wrecked against the rocks.

Crossing the bridge we ride a short distance to Phantom Ranch where we find the miracle of a group of artistically built stone cottages and a dining hall here in the depths of the earth. There is a little stream, interesting vegetation, and friendly birds that twitter about.

This is to be our camp for the night, and an amazingly comfortable place we find it; and the next morning, refreshed

with the sort of sleep that only comes after an active day in the open, again we mount our faithful mules.

There is a good trail all the way to the top of the north Rim and the Kaibab Forest, with plenty of interesting things to do after one gets there. We decide, however, to ride only to Altar Falls, where there are more inspiring views to enlarge our souls. Then there must be luncheon and a leisurely ride back to Phantom Ranch for the night. The third day takes us over Bright Angel trail once more to our starting point.

Altogether we stay at the Canyon—headquartering at comfortable El Tovar—for over a week. While nothing can surpass our first wonderful view of the chasm, we come to know it in other moods. We see tiny isolated showers in the Canyon that make us think of bridal veils, and, after one of these, a rainbow spans the central gorge.

Standing on the Rim we see the god of storms brewing clouds down in the depths. We watch the white wisps of vapor as they blow in from side gulches, join masses in the larger canyons and rise majestically past us like great silver-gray balloons.

We see the Canyon by moonlight when it seems a softened spiritual replica of what it is by day. We meet the Old Traveler who tells us what it looks like in January when the Rim may be snow covered while flowers bloom down on the lower levels. With each succeeding day Rim and Canyon alike hold us with a fresh lure, a new fascination.

We drive to various points of interest along the Rim under the tall pines. Some of us go down the Hermit trail, others make a camping trip to Havasupai Canyon, visiting the Indian village in its depths.

Photograph by Gen. H. F. Robinson

Visitors on the house-tops viewing the snake dance, Walpi, Hopiland, near Painted Desert.
Irrigating canal, Roosevelt Project, Arizona. Camelback Mountain in distance.

When at last we have to leave, with many regrets we say good-by to Bill, and boarding the Santa Fe Pullman almost at the door of El Tovar we go back again into the world, but the witchery of it all, the mystery and the soul-expanding glory of the Canyon will never wholly leave us.

CHAPTER XXXI

THE PAINTED DESERTS—PETRIFIED FORESTS

ALL who have read about the Southwest have seen references to the Painted Deserts, and while naturally they would gain the impression that these areas must be colorful places, most people have only the vaguest conception as to what makes them what they are or indeed what they look like.

The rocks of the Southwest, in common with rocks everywhere, are colored, some of them very vividly; only where rocks in a moist climate are apt to be partially or wholly hidden by lichens, mosses and vegetation, in the Painted Desert country they are nakedly exposed to view. As the desert floor is composed of eroded rock that has washed down from a higher level and the amount of decayed vegetable matter that mingles with it is very small, the soil-covering is as colorful as the rock. When a single color in rock or earth covers a large area our eyes, becoming accustomed to the tint, fail to realize how vivid it is. It is only when a color is put in contrast with other hues that we realize its value.

The Painted Deserts are broken areas where stratified sections of cliffs and buttes show many contrasting colors which, combined with the striking hues of the soil surface, make it a gorgeous spectacle.

Most maps seem to indicate that there is only one Painted

Desert and that it lies just east of the Colorado River where it turns north after receiving the waters of the Colorado Chiquito. While this is the largest section where the richness of chromatic tinting specially entitles it to the name, there are a number of smaller areas in the country north of the Santa Fe railroad tracks in Arizona that equally deserve such a title.

There is one small Painted Desert north of Winslow on the road to the Hopi country that is exceptionally beautiful, and another lies east of Winslow, where in one place it comes to the very edge of the National Old Trails highway.

In the largest Painted Desert the colors in places approach the gorgeous warm rose tones so characteristic of the Grand Canyon. In the ones near Winslow a different note is struck. Here the soil is composed of sedimentary deposits of clay in shades of blue, mauve, amethyst and similar delicate hues. Floods rushing down from higher lands have washed twisting channels twenty or thirty feet deep through this plain, leaving innumerable islands whose terraced sides bring to view all these wonderful tints. At midday the colors look flat and less vivid, but with the slanting rays of the morning and evening sun aided by shadows of varying density a scene is produced that is not only very lovely but is different from any other spectacle to be found in Nature's varied art gallery.

PETRIFIED FORESTS

The fallen petrified forests of Arizona are places of rare fascination. This is not primarily by reason of their scenic beauty, inspiring as their settings may be; and not so much for the loveliness of the fossilized trunks themselves, although these metamorphosed logs are veritable jewel caskets filled

with delicately tinted semiprecious stones, but above all, the lure of these places is found in their imagination-stirring history—a tale more marvelous than the best of Scheherazade's, and as true as our old friend the multiplication table.

We talk of the antiquity of the California redwoods—the oldest of living things. These Arizona logs had turned to stone millions of years before the oldest redwood now growing had started from its seed. We think of mastodons and mammoths as living in a far distant past, yet these strangely transformed trees grew in an age that had wholly passed out of existence eons before the first of those species shook the earth with their lumbering tread.

They are even vastly older than the fossilized remains of tree trunks found in the Yellowstone or California. To reach the time of their growing we must adventure back before the age of mammals, so the distant Triassic or Jurassic Mezozoic and picture these trees rearing their lofty heads when this section of the Southwest, instead of being a high, desiccated plateau, was a moist swamplike country. Most of the trees were a conifer that botanists now designate as *Araucarioxylon Arizonicum,* ancient relatives of the Norfolk Island pine. With them were a few willows and a tree resembling the modern cottonwood.

There were no singing birds among the wide-spreading branches, no birds whatever except possibly such as the archæopteryx, the first flying feathered creature in the world, which had teeth in its serpent-fashioned jaws and claws at the corners of its wings. A more likely dweller in the treetops would be the pterodactyl, a great batlike creature, looking more like a hobgoblin ready to spring at one from a bad dream or a Riley spook-verse than anything saner.

Also we must remember that there were no flowers in our swamp, nor for that matter, anywhere else in the world, nor bees to hum about them nor butterflies to sip their nectar. There were no rabbits to hide in the rank shrubbery, no deer to nibble upon it. Instead of mammals, huge dinosaurs, forty, sixty or more feet in length, dragged their bodies heavily beneath the branches, gorging themselves upon the succulent brush.

For centuries these trees flourished in some such exotic company and then came catastrophe. Just what it was that happened we probably will never quite know. A likely thing is that there ensued a period of torrential rains which extended over a wide area, producing floods that loosened the roots of the trees, with following winds, or possibly earthquakes of such tremendous violence that every tree of these forests was laid low.

Further deluges may have caught the fallen trunks and the swirling waters have carried them into the groups as we find them to-day. What seems to be evidence that all, or most of them, were carried from their places of growth is that there are seen no remains of twigs or cones where they now lie.

Let us presume they finally found quiet water where in time, grown heavy with long soaking, they sank and became buried in the muck of sand and clay at the bottom and, year after year, century after century, they were still farther covered by sedimentary deposits.

It was an age when land was far from stable. As time went on the entire region sank until these tree trunks rested on the bottom of an inland sea or perhaps an estuary of the Pacific; here innumerable tiny skeletons of marine life may

have been deposited with the bones of the great reptiles that already lay among the sunken tree trunks.

It was an era, too, of volcanoes, and hot springs may have warmed these waters. It was at this period when Time and Nature—superchemists—began by cunning devices their work of changing wood into jewels. To silica was added red oxide of iron and this with other mineral solutions, they forced into the wood; and so skillfully did they work that, molecule by molecule, atom by atom, they replaced the fibers with duplicate structures in stone which in many instances preserved every cell of the original substance.

Centuries grew into millenniums; still the ground sank and steadily the bank of sediment thickened above the buried logs until at last they were covered with a deposit not merely a few hundred feet thick, but with a bank, geologists tell us, of nearly two miles. Think of the time it must have taken! Think of the pressure on the logs! It was early in their long burial that the transformation from wood to stone took place, otherwise they would have been flattened until they would have looked as much like pancakes as logs.

Thus came and passed the Cretacious era and with it the end of the Mezozoic, and the dinosaurs and the pterodactyls and all their many strange companions disappeared utterly from the face of the earth. Came the beginning of the Cenozoic. Mammals began to appear. Entered the Miocene, the period when such mighty mountains as the Alps and Andes and Rockies came into being. At this time, too, the bank under which our tree trunks lay was thrust upward slowly but steadily. First out of the sea into the air it came, then ever and ever upward it rose until the top of the deposit

covering the trunks was three miles above the level of the blue waters in which it had been formed!

But long before the ultimate height had been attained, indeed as soon as the top of the bank was above water, our superchemists had begun to lay plans for uncovering their work of metamorphosis. So Father Time's combined hose and vacuum cleaner—erosion—the wear of wind and water —was put on the job. And even as submergence, sedimentation and elevation had taken eons upon eons to finish their tasks, equally long was the time taken to dispose of this tremendous deposit that covered the logs.

But with Time, who never feels the pressure of haste, and with Nature, who is ever patient, everything is finally brought to pass and, at last, thousands of millenniums after the logs had fallen asleep as wood in the Mezozoic swamps they came to the light of day in a modern world as chalcedony and agate; a glorious, colorful recrudescence!

To the visitor in the Southwest who wishes to view these wonders of Nature's handicraft we may say that the four large groupings of them most accessible are reached from Adamana on the Santa Fe, if one comes by train, or by a detour from the National Old Trails highway, if one is motoring.

What is usually called the First Forest is nine miles south of Adamana. Here visitors are always interested in one of the petrified logs that spans an arroyo sixty feet wide.

Second Forest is two and one-half miles south of the one already mentioned, and includes nearly two thousand acres. While most of the logs in all the forests are broken with sharp cleavage into sections from a foot to six feet in length here are found an unusual number of long, unbroken trunks.

Rainbow, or Third Forest, to the southwest of Second Forest, is reached by a road four miles from First Forest. It is not only larger than any of the other forests, but is notable for the number of very long trunks, several hundred being over two hundred feet long. The name "Rainbow" is well deserved, as the browns, yellows, reds and blues of the fossilized trunks are most beautiful.

Blue Forest is northeast of First Forest, and is reached by a separate road direct from Adamana. It derives its name from the fact that a number of its logs have a decidedly blue tint. The natural setting of the forest is admirable, the tints of the bold cliffs carrying out a color scheme in combination with the blue of the logs in a way that gives high praise to Dame Nature's artistic sense.

Nine miles north of Adamana, lying at the edge of a typical "Painted Desert," is Fourth or Sigillaria Forest. If the logs here lack the brilliant coloring of the other sections, the vivid hues of surrounding buttes and mesa escarpments more than compensate the visitor for this lack.

CHAPTER XXXII

NATURAL BRIDGES—CAVES—RHYOLITE PARK

HERE are a number of natural bridges in the Southwest, two of them easily coming within the designation of world spectacles. Noteworthy as they both are, they are as different in their appeal as a bust by Rodin might be from a Corot landscape.

The Goodfellow bridge is incorporated in a scenic little twenty-six acre ranch on Pine Creek, about seven miles south of the Mogollon Rim and easily reached by a seventy-six mile drive north over a good road from Roosevelt, Arizona.

The first glimpse you catch of the ranch is when your car turns for a rather sharp pitch down the upper slopes of Pine Creek Canyon. You are in the foothill country. All around are hills of varying steepness over which are scattered Arizona cypress and other conifers. Below you in the center of these descending slopes is the patch of vivid green which comprises this unique mountain homestead, emerald-like in its beauty, and held in a perfect setting.

Arriving at the cluster of ranch and guest houses that are grouped at the edge of the verdure, the Goodfellow family, maintaining the traditions of their native Scotland, give you a hearty welcome, and as you are shown about the place you find it even more beautiful at close range than it was at a distance. There are flowers, apricot, fig and other fruit

trees, and a vegetable garden, all watered by two ever-flowing springs, precious beyond comparison in this land of little rain.

Flanking the orchard is a small patch of alfalfa, and, as you follow a path through it, it suddenly occurs to you that you have been so interested in the ranch you have forgotten all about the bridge, and now ask its location.

This is the supreme moment for your guide. "You are walking over the top of it now!" he says.

Sure enough you are, the field being actually on top of the bridge. You can only realize it though, when he leads you to a hole in the ground and, with a queer sensation of unreality, you peer down into a weird subterranean cavity, then, following him to the edge of the field, find yourself on the brink of a cliff and, again looking down, see the bottom of Pine Creek Canyon, one hundred and eighty feet below you.

Cautiously you descend a steep trail, gaze into a great pool of crystal-clear water, climb ladders that lead to a mammoth chamberlike cavern, the starting place for other caves. Stalactites hang from the roof and stalagmites rise up from the floor about you, moist and ghostlike as they should be in any properly arranged cave.

Again you descend to the bottom of the canyon and now explore the arch beneath the bridge. One hundred and forty feet wide at the bottom the opening is, so your guide tells you, and perhaps three times that breadth at the top if you count the big chamberlike cavern. The width of the bridge up and down the creek is about five hundred feet.

You feel a bit worried for fear the structure will give way and drop the alfalfa field down upon your head until you

learn that there are seventy-five feet or more of stone between the top of the arch and the surface of the ground.

Out in the sunlight you go again, wander about the canyon, and, as it is August, pick wild flowers and notice friendly forms among the many birds.

When at last you climb the trail to the ranch level, the suspicion that has been growing upon you becomes a conviction. Up above where the ranch and houses are—that's where the regular people live, but down below is a pixy place where kindly gnomes work in the caves making stalactites, and among the rocks, vines and shrubbery at the bottom of the canyon elf children play tag with the cottontails and jackrabbits.

Of course, in a place like this one wonders just how all these queer formations came about. You are told that here Dame Nature did not follow her usual plan and specifications for making natural bridges—that of allowing a tiny rivulet of water, under pressure, to find a soft spot through a dike, the opening to be enlarged by a greater stream. It seems she did it quite differently.

The waters of the two springs on the east side of the canyon that are now used to irrigate the ranch are strongly impregnated with lime. For centuries they flowed down the side of the canyon, continually depositing on the bed rock some of the lime content of the water in the form of travertine.

Little by little these deposits built up a dike until the waters were forced against the opposite side of the canyon, and while the flowing stream at the bottom kept an open channel, the deposits of travertine pushed themselves across above until the arch was formed.

Before the coming of the white man the bridge and springs were a favorite rendezvous for the Tonto Apaches who roamed through the region.

In contrast with the ease with which the Pine Creek bridge may be visited, the journey to the Rainbow Arch is something of an undertaking. Perhaps we should be glad, though, that there are still marvels in the Southwest demanding exertion enough to reach so that upon arriving one may feel the glow of achievement.

One way to make the trip is to leave the railroad at Gallup and drive by automobile through Chinle to Kayenta, where there is a trading store. Here a camp outfit and guide can be obtained and a ninety-mile lap of the journey continued on horseback, the trail leading through Marsh's Pass and Laguna Canyon, and, keeping north of Navajo Mountain, crossing into Utah to the Arch.

A much shorter route from a railroad station would be to go by motor from Flagstaff to Rainbow Lodge via Cameron, Moencopi, Tuba City and Red Lake. At Cameron, where are hotel accommodations and a trading post, the traveler crosses the gorge of the Little Colorado on a suspension bridge six hundred and sixty feet above river bed. The road from here—at one point passing near where dinosaurs, eons ago, left footprints in what is now sandstone—leads over the Painted Desert to Moencopi, the most westerly of the Hopi villages. A couple miles further on one goes through Tuba City, the western Navajo Indian agency and school. It is seventy-six miles from Flagstaff to Tuba City, and about twenty-five from there to Red Lake. Here there is a small hotel and one-room bungalows for sleeping quarters. From Red Lake the traveler drives north about sixty-

five miles to Rainbow Lodge, situated at the foot of the south slope of Navajo Mountain. Wonderful views are obtained here of the Painted Desert, Forbidden Canyon and Navajo Canyon. Here, also, are accommodations for spending the night, and one may secure saddle horses and pack animals to continue his journey to the Arch.

The trail passes along the south and east sides of Navajo Mountain. An unforgettable part of the ride is through Redbud Pass where towering red sandstone cliffs, nearly one thousand feet high, come so close together that the rider by stretching out his arms may touch both walls at once. About a mile from the Arch is a unique camp whose roof is a tremendous overhanging cliff. Here meals may be had, and, if one wishes, he may spread his blanket and spend the night protected by the sheltering rock.

The Rainbow has been made familiar to the world through many artistic photographs, but, as is not always true in such cases, Art here has made no promises that Nature does not more than fulfill. You are in a wild, rugged country. On all sides there are broken rocks, bare buttes, cliffs and mountains. The Arch is in key with the rest of the picture.

Over three hundred feet it rises before you, with a span of two hundred seventy-four feet—almost equal to a city block—the biggest natural arch in the world. It is composed solely of naked red sandstone in various shades, with no seams to permit the accumulation of soil or the sprouting of vegetation. A stupendous thing! No wonder the Navajos hold it in awe and veneration. They call it "Tsay-nun-na-ah"—the rock that goes far across the water. No wonder you, as do all who have stood beneath it, feel the tremendous force of it.

It is called a bridge, but that is an imperfect and inade-

quate term. A bridge is something people use to cross over a depression. As a crossing place, the Rainbow Arch would be about as convenient for travelers as a rainbow might be that should appear in the sky.

Situated as it is, only a short distance from the Colorado River, one wonders if the high gods, after completing the Grand Canyon didn't have their head sculptor, Old Man Erosion, chisel this out as an *Arc de Triomphe* to commemorate that consummation.

In taking the trip, while the Arch well deserves the spotlight and center of the stage, if for no other reason than that there is not another in the world like it, there are many other marvels of man's and nature's making, scarcely second to it, that might be included in your itinerary. On your way there you could, without much trouble, detour from Kayenta to those ancient cliff dwellings, Kietsiel and Betataken and, as well, Inscription House, all not far from Navajo Mountain, or, on the road to Rainbow Lodge, twenty-five miles from Red Lake, there is an eight mile side road to Inscription House.

Returning, one might go by way of Monument Valley, and view scores of weird-shaped, towering buttes and mesas, gorgeous in their stratified coloring.

Inheritance can scarcely be cheated out of the credit of giving a man or woman his start in the world, but an exceedingly large part of his personality is the result of his experiences. On a trip like this it is not only what you see, but what you do, and what you feel that counts.

Even learning how to throw a diamond hitch or bake beans in a pot buried in hot ashes is worth the trouble of the journey. Then, when to such items as managing the beans

and the pack mules, you add the experience of sleeping in the open with the big luminous stars of the Southwest barely out of reach of your hand, when you have been breathing air more sparkling than the best champagne that ever gurgled out of a bottle, have seen some of the most inspiring scenery of the world, and have learned intimate things about mountains, birds and beasts, trees and plants, little discomforts become inconsequential items. What's a few grains of sand in one's shoes, a bit of sunburn at the back of one's neck, the peeling of one's nose! Mere bagatelles. Think of the glow you have had about the heart!

CAVES

There are many interesting caves in the Southwest. We are already familiar with the numerous grottos in the cliffs that were used as habitations by prehistoric peoples. Then there are the curious ice caves located near Flagstaff and in other places. Here are caverns where, some time in the distant past, bodies of water held by them encountered a sufficient degree of cold to congeal and, while still frozen the ice was covered by lava flows which since have acted as natural insulation to prevent melting.

In limestone deposits in different localities natural caves are found whose subterranean passages attain considerable magnitude. In Mammoth Cave near Tucson such openings in the earth extend for a total distance of about twenty-two miles.

However, the best known of all the caverns of the Southwest is the one situated about twenty-six miles southwest of Carlsbad, New Mexico, and about ten miles north of the Texas line.

In telling about the wonders of our Enchanted Land, although the reader might not suspect it, we are reluctant to resort to the superlative; but when one is writing about a superlative country there seems to be no way to avoid it and at the same time tell the truth. So to be over with it at the start, let us say that the Carlsbad Cave, in many respects, is one of the most remarkable in the world. If this sounds too enthusiastic let me quote Mr. Willis T. Lee in the National Geographic Magazine: "Carlsbad Cavern, New Mexico, is the most spectacular of underground wonders in America. For spacious chambers, for variety and beauty of multitudinous natural decorations, and for general scenic quality, it is king of its kind."

In describing even a beautiful cave there is apt to be a certain monotony if one takes up the features of the different chambers with too much detail. After the reader has been guided through four or five of such apartments he is apt to say: "What, still another one! Still more stalactites!" and skip to the last paragraph. Permit me to help you out in the matter by taking the skips myself.

However, so we will all feel at home in the vicinity, let us glance about a bit before entering the cavern. It is a broken, desert country, of about four thousand feet elevation, with a vegetation that includes such cacti as the prickly pear and the "hedgehog" and, as well, sotols, ocatillas and scrub mesquite trees. To the southwest are the rugged Guadalupe Mountains whose crests rise more than a mile above the plain below.

In the winter ice will freeze on the plain outside the cave, and on midsummer days the thermometer will be pretty apt to register something above one hundred, yet within the

cavern the temperature is always the same, an almost perpetual fifty-seven degrees.

Some of the subterranean chambers maintain a nearly level floor, others are quite uneven and in journeying through passageways there will be hills to climb and descend and pits and abysses yawn at one's feet. Some of the chambers can be reached only by means of long ladders. In one of the principal rooms the vaulted ceiling attains a maximum height of three hundred feet.

As in all caverns in limestone formation, stalactites and stalagmites abound. In the many beautiful and curious forms they assume, in their delicate texture and tinting lies the glory of the Carlsbad Cave. In certain chambers the original limestone walls are completely concealed by fantastic ornamentations in onyx marble.

Some of the stalagmites reach the proportions of buttes or great domes. In one place, water dripping from stalactites, carrying the usual solution of calcium carbonate, has caused the formation of stalagmites in the form of very beautiful drinking basins brimming with water which, at the edges, will have ice-like incrustations of onyx. Sometimes the stalactites take the form of delicately wrought portieres, in other places they look like great chandeliers.

An interesting feature of the cave is the formation on the floor in certain sections of "nests" in which "pearls" are made by the splashing of drops from the ceiling, the force of the fall pushing the pearls about and preventing them for a time from fastening themselves to the bottom of the nest. These semiprecious jewels attain about a half inch in diameter. They are formed in concentric layers just as pearls are made in an oyster, and are often lustrous.

It has frequently been suspected by visitors, after journeying through this enticing underworld, that it is in very truth the original cavern so sumptuously fashioned and furnished by Aladdin's efficient genie. It is only fair to add, however, that this theory is seriously questioned by scientists.

RHYOLITE PARK

When, as all old-time Pimas know, Jewarta Makai, earth creator as well as magician, finished scooping out the Grand Canyon he had a vast amount of curiously formed rock for which he had no definite use, so he went to Elder Brother for suggestions.

"You will remember," replied Elder Brother, "when making the first Apaches I bruised my finger and got blood on the formation clay, which made the tribe not only cruel but very quarrelsome. It's not their fault, but mine. Still, they are so unpopular with their neighbors that unless I can find a place for them to hide in after their raids, I am afraid they will be wiped out. Why can't you drop your rocks down in a corner of Apache Land and make a refuge?"

"Good thing if they were all wiped out," snapped Coyote, the third of the trio of high gods, "they kill my people." But the other two seldom paid much attention to what Coyote said, and the Earth Magician, even if he wasn't specially fond of Apaches himself, liked to please Elder Brother, so he started tossing the rocks across the two hundred miles or so that lay between the Canyon and what was then the Chiricahua plain.

"Why don't you pile them up quaint and different," suggested Coyote. "With all those curious rocks you ought to make something pretty nifty. If you ask me," he

added impudently, "your work has been a bit monotonous lately."

The Magician pretended not to hear, but, nettled, he did pile up his rocks "quaint and curious," with not a little art mixed in with it besides.

After it was finished Coyote inspected the place critically. "It will be a good spot for my children to come and meditate upon the follies of men and gods," he said sardonically.

"It will be dried bones they will be meditating about," grunted Elder Brother, "and if they come around very frequent, they may get a Chiricahua arrow instead of thoughts in their brains."

Too dignified to take notice of this exchange of incivilities, Jewarta Makai surveyed his work with satisfaction. "It will be a place of beauty and wonder," he said, "that will give pleasure to men and gods while the world shall endure. I have done well."

He had done well, so well indeed that the United States Government has put its endorsement upon the job by making it a national monument. Now known as Rhyolite Park, this wonderland of rock excites the highest admiration of all who see it. The varied outlines of stone suggest minarets, campaniles, and castles; they take to themselves the outlines of beasts and birds, of human forms and faces.

There are a number of "balanced rocks" in the park. One of these, "The Top" is twenty feet across its upper surface, which stands twenty-five feet above its balancing base of three and one half feet.

Near the foot of a noted group of rocks which from their shape are known as the Pipe Organ is a comfortable public camp ground, which each year is used by an increased number

of visitors as travelers learn the unique fascinations of the spot.

The place, too, is interesting in a historic way as well as from a scenic and legendary point of view. Just as Elder Brother hoped they would, Apaches used the Wonderland of Rocks as a place of refuge, for it was like a maze to a stranger who should try to penetrate it, and a handful of warriors could defend it against an army. They also used it as a rendezvous from which many a bloody raid was launched against peaceable Indian tribes, Mexicans and Americans alike. And the children of the demigod, Coyote, fattened off the bones of the spoils!

It may not be out of place to record that when Jewerta Makai was hurling his rocks across the country, one great handful went wild and, landing just north of the present city of Prescott, made the curious formation known as Granite Dells.

Twenty-three miles west of Winslow there is a great crater six hundred feet deep and three miles around, which white scientists tell us was made by the falling of a huge meteor. A group of men have spent a small fortune in drilling in the attempt to locate this missile from the skies, believing that when they find it, it will not only contain meteoric iron but possible precious metals such as platinum.

I have an old Indian friend, Varsak Valii, who shakes his head in superior wisdom when I give this explanation. He knows that it, too, was made by one of Jewerta Makai's rocks, only this one was hurled so high in the air that when it came down it buried itself too deep for any except a very wise medicine man, indeed, to scratch it out.

CHAPTER XXXIII

EL MORRO, CROSSROADS OF THE CONQUERORS

KNOW a kindly, picturesque old chap, Jim Littlefield, who says that this country is growing too "fussy," and that the most interesting form in which this "fussiness" has shown itself is the way it has interfered with his own combined commercial and artistic calling.

Jim, it seems at the time of an earlier generation, was, to use his own term, a "Nature Embellisher." He could take an ordinary dull bowlder that stuck up plain and unattractive along a country road and by expending a few minutes' work upon it with paint pot and brush, convert it into an object not only of information but one having a marked artistic and literary appeal.

Jim showed me some of his cards marked with "embellishments."

"For hoopskirts and plows
Go to Hewletts and Howes."

"Tobacco is soothin'
But licker is bad.
If you chew Jackson's Best
You'll keep sober and glad."

Being an ardent Republican he would sometimes express his opinion of opposing political heresies by such couplets as,

"Greenbackers and sich
Is worse than the itch."

"Moral and informin', all of them," said old Jim, "only

the cards don't give you no idear how grand the signs looked life-size, so to speak, in colors on the rocks."

Now that Jim is out of business we may easily condone his crimes and smile at his point of view. No feeling but one of bored disgust, however, can be held in the case of the young man whose microscopic intellect and perverted vanity prompted him to write his insignificant name upon the walls of the historic Casa Grande. The excoriation he received from the lips of the outraged custodian, we may well agree, was a punishment only too mild for the offense, even if he did apologize most abjectly and, under the grim directions of Uncle Sam's representative, assiduously apply an eraser in the removing of his affront.

Nevertheless, there is here in the Southwest a monumental cliff of gray sandstone that towers upward over two hundred feet above its base, whose well-deserved fame is derived solely from autographs inscribed upon its smooth surface. This, of course, is the famous wedge-shaped mesa, El Morro, so named by the Spaniards in the seventeenth century from its castlelike front and precipitous sides.

About thirty miles eastward from Zuñi it stands at the Crossroads of the Conquerors! Spaniards en route from Santa Fe to Zuñi or from Isleta to the Hopi country might make this great rock an overnight stopping place. Here they would find a good waterhole and wood handy for a camp fire. El Morro would afford shade in summer and in winter it would not only catch and hold the warm sun's rays on its southern exposure, but provide shelter from cold winds.

The custom prevailed for a member of each party before leaving to inscribe with knife or sword point upon the soft

sandstone the names of at least the leaders of the travelers with a hint, perhaps, of their business.

The impulse that inspired this act was wholly different from the one that prompted the young man to autograph the walls of Casa Grande. This modern youth sought to achieve a cheap notoriety by putting a meaningless name in a famous spot, even if he had to deface a wall to do it.

Here the face of the rock was dedicated to these autographs, like the register of a hotel. More than that, the men who made these inscriptions were on important, often desperate business. There were grave possibilities, and at times probabilities, that their missions would cost them their lives. They were leaving behind a record for their fellows in arms, and, if the writers should never return, information to be forwarded to their homes on the Rio Grande or in Mexico. Also, if, after accomplishing a more than ordinary achievement, occasionally a flourish of self-applause should be indulged in, in all conscience, these men were entitled to it.

The earliest record, save possibly one other regarding which there is considerable question, when converted from the original abbreviated Spanish into English reads: "Passed by here the Commander-in-Chief Don Juan de Oñate, from the discovery of the South Sea on the sixteenth of April, 1605." This was recorded by some one in the conquistador's command. Oñate, as is well known, was the earliest white colonizer of New Mexico, founding the first city, San Gabriel, in the new land. As the inscription indicates, his stop at El Morro was on his return from his famous explorations along the Colorado River to the Gulf of California.

Of equal importance and interest is the record of the gal-

lant general and administrator who reconquered the country after the uprising of the natives in 1680. "Here was the General Don Diego de Vargas who conquered for our Holy Faith and for the Royal Crown all of the New Mexico, at his own expense—year of 1692."

The phrase "at his own expense" is worth putting down. He was winning back the colonies, not to enrich himself but the State.

In 1636 there was a party camped at El Morro that included a lieutenant-colonel, a lieutenant and an ensign, which simply left autographs of the members. Knowing the Spaniards, we may imagine that their command may not have included over a dozen men, which they would call an army—and it would do the work of an army!

In one place we find an inscription made by a common soldier, but a gallant one. He was afterward killed at Zuñi in 1700. There is a later record of the leader of six men who, in 1701, were on their way from Santa Fe to Zuñi to avenge his death.

A much later inscription is made concerning Governor Don Francisco Manuel de Silva Nieto, who was willing to let the world know just how valiant and diplomatic he was, both as a warrior and a statesman.

On one journey his record, among other things says: "That the impossible has already [been] effected [by] his arm indomitable." At another time when he stopped at the crossroads after he had received promises that the Zuñis would live subservient to the Spanish crown he has recorded that he did his work with "persuasiveness, zeal and prudence."

Thus the different records run. There are autographs of priests on their way to convert the heathen. There are later records that indicate the heroic padres' martyrdom.

A bishop has his name recorded. More of the names indicate a humbler station, but all speak of fortitude and heroism. Any one of the inscriptions might serve as inspiration for tales of adventure with high stakes.

The earliest and the only important "Saxon" inscription is that of Lieutenant J. A. Simpson, sent on an important journey of investigation by the American war department into the Navajo country. With him was his artist, R. H. Kern. It is dated September 17-18, 1849.

Although its most obvious story is that of the conquistadores, El Morro contains another tale if the record could be read. The top of its great surface is split by a gorge into a "V". On each side of this gulch is the ruin of a prehistoric pueblo, in which dark-skinned people—no one knows how long it was before the Spaniards came—labored, loved, fought off the nomads, and, as is the way of flesh, finally passed to their fathers.

Our government has done well to make El Morro a national monument. It is one of the most important historical documents in America.

BUILDERS OF THE SOUTHWEST

CHAPTER XXXIV

FROM PACK TRAINS TO PULLMANS

To those whose blood quickens at the thought of heroic actions and great achievements, the story of the development of the Southwest will always have an appeal; and among the many chapters that go into the making of the tale few should stir the imagination more than that dealing with the way pioneers of that rugged country put through their transportation. Transportation! If the word suggests to you the quiet, smooth waters of commerce rather than the white foam of adventure remember that transportation in the Southwest in the days of the pioneers meant such things as blazing the Santa Fe Trail, crossing deserts worse than the *Jornada del Muerto,* and resisting attacks by bandits and Indians upon pony express lines, stage coaches and wagon trains.

But let us not set off all our fireworks before the show really starts. We might as well begin at the beginning and take things mildly for awhile.

Doubtless owing primarily to the lack of a native beast as tractable as the Asiatics found the horse and ox, the Indians of the Southwest, as elsewhere in North America, had no better way of getting about the country than by using their own well-muscled legs, nor did they contrive any carrier of freight superior to their broad backs.

Then the white man came, and in his train were the two

sorts of beasts he had long ago coerced into doing his carrying for him. Also he brought with him the secret of that wonderful mechanical device, the axled wheel.

It was Coronado, the first *conquistador,* who, in 1540, introduced into the Southwest the horse that carried the warrior, and the progeny of the ass and mare that bore his supplies. Fifty-eight years later came Oñate, the colonizer, and behind his band of immigrants trundled the rude *carretas.*

Although the Indians had been using excellent foot trails since the days of Greece and Rome, they had need of a path no wider than that required by a single file of travelers. So the oxen in Oñate's wagon train had to make their road as they went along. A most casual affair it must have been, and so all but impossible was it for wheeled vehicles that for many years afterward pack trains were given preference in moving merchandise between Chihuahua and Santa Fe.

The original *carretas* were as primitive as the road. No iron whatever entered their construction, the various parts of wheels and supporting framework being fastened together with wooden pins. The wheel might be simply sawed-off sections of a log, or made with two broad pieces of wood crossing each other to take the place of poles lashed to clumsy rims. The body of the cart was usually of poles lashed in place by thongs of rawhide, and with an ox skin for a bottom. The vehicle was almost invariably drawn by oxen whose yoke was tied to the beasts' horns by more rawhide thongs. Grease was never used on the axles, and as the *carreta* moved leisurely along its way, its agonized squeakings and creakings would presage its arrival a half hour or so in advance.

Moving freight by pack trains in those days was far more

highly developed than transportation by carts. While the countryman was satisfied to use the lowly burro to carry wood from the hills to his dwelling or corn from his field to market, merchants importing or exporting goods in quantity used, when they could get them, trains composed of good stout mules.

As mules will often develop a remarkable affection for a mare, such an animal would often be put in the lead. One white in color was preferred, as, so marked, she could be more plainly seen than one of another color, especially at dusk; and, as she traveled along with a bell at her neck, the mules would follow her with unswerving fidelity.

Important pack trains were handled with a system almost military. The pack-master was the *patron,* whose authority was supreme, the packers were called *arrieros,* the head loader was the *cargador.* These men rode heavily armed to guard the train—or *atajo*—from bandits or Indians.

The usual load of a mule was from 150 to 200 pounds, though in an emergency a stout animal could carry more. Once the pack was secured by rope and *cinche* by the *cargador* and his assistants, an animal could shed his skin about as easily as he could his burden.

Fifteen miles was usually considered a day's journey, though if necessary beasts in good condition could go twice that distance.

As gradually the roads improved *carretas* came generally into use. Even what were considered good roads in those days would be classed as quite impassable now, and because a *carreta* could go over trails that would be impossible for a wagon, they were used between Hermosillo and Tucson, and between Santa Fe and Chihuahua, even after the country had

become a part of the United States. What made them especially available to the poorer classes was the fact that they could be manufactured at home.

About Santa Fe, when better roads permitted, a few carriages of state were driven by officials and other members of the aristocracy, imported by them from Mexico where, by 1625, they were largely used.

The first wagon road to be opened between the States and New Mexico, and indeed the one important one until well past the Mexican war, was the famous Santa Fe Trail, now a part of a national automobile highway between the East and the Pacific Coast.

No very accurate information concerning these Spanish colonies reached the Mississippi Valley until, in 1807, Maj. Zebulon M. Pike brought back his glowing report.

It will be remembered by all students of American history that Pike had been sent to the Southwest on a mysterious exploring expedition, under secret orders from the American war department. With a small command he not only entered Spanish territory, but actually built a fort on a tributary of the Rio Grande. He was apprehended by Spanish officials and brought to Santa Fe, and although detained as a prisoner, he was treated as an honored guest and shown great hospitality. In spite of the suspicious nature of his expedition, when taken before General Salcedo at Chihuahua, his explanation that he had been confused in his location and thought he was building his fort on American territory was taken at face value, and he was set free.

When Pike told merchants at St. Louis that Santa Fe aristocracy, the *ricos,* were paying twenty-five dollars a yard for imported silks and woolens brought up from Mexico, it

needed no demonstration in intricate mathematics to convince these dealers that there would be profit in outfitting caravans to carry merchandise to Sante Fe.

However, Spanish officials were very jealous and suspicious of the Yankees, and had no thought of allowing them to absorb this lucrative commerce, so when the first traders with their pack-trains arrived at Santa Fe, not only were their goods confiscated, but the traders themselves imprisoned.

In 1821 Mexico secured her independence from Spain. Immediately this hostility ceased and trade with the States was cordially welcomed.

During 1821, '22 and '23 a number of venturesome small merchants conducted pack-trains from Franklin, Missouri, to Santa Fe, and most of them made handsome profits on their goods. After 1823, however, freighting was usually done in wagons. At first the stock used was horses or mules, but later oxen were found to be more satisfactory.

The hardships endured and the difficulties that were overcome by these hardy traders were tremendous. They carried their own provisions, marked their own roads, made their own laws, treated one another when sick, and defended themselves against hostile Indians.

Capt. William Becknell, who has been called the father of the Santa Fe Trail, made the first trip by wagon to Santa Fe in 1821. The year following, on a second trip, when taking an unfamiliar cut-off between the Arkansas and the Cimarron Rivers, he and his party were saved from death by thirst only by chancing upon a buffalo, which they killed, and drank the water found in its stomach.

In his "Commerce of the Prairies," Dr. Josiah Gregg states that the earlier travelers were not often attacked by Indians,

but later, owing to the reprehensible actions of the traders themselves, in retaliation the red men became actively hostile. Gregg goes on to say, "Instead of cultivating friendly feelings with those few who remained peaceful and honest, there was an occasional one always disposed to kill, even in cold blood, every Indian that fell into his power, merely because some of the tribe had committed some outrage either against themselves or their friends."

These statements of Dr. Gregg's have often been quoted to prove that if the attitude of the whites had been friendly and just, the caravans would never have had any trouble with the Indians. There is no question that there were white men in some of the trains who were as vicious and wantonly cruel as the worst of the Indians, and should have met the fate of murderers at the hands of their fellows for their attacks upon inoffensive red men. Still Gregg's deduction is scarcely warranted when we remember that among such predatory tribes as the Pawnees, Comanches, Apaches and Utes, the raiding of alien tribes, and of people with whom there was no friendly alliance, was a laudable recognized pursuit. Very often, young bucks proved their right to be classed as warriors by the cunning and bravery they would show in these exploits.

By 1826, merchants with large capital began entering the Santa Fe trade, and caravans well equipped as to wagons and stock were each spring started on the 775 mile journey across the plains to that land of romantic and financial allurement—the Mexican settlements on the Rio Grande.

A good sized caravan usually consisted of from twenty-four to thirty strong Missouri wagons, each carrying from 5000 to 7000 pounds of merchandise. Besides this there

would be a mess wagon where provisions for the trip would be packed. Five yokes of oxen would be hitched to each wagon, with extra yokes to take the place of any stock lost on the way.

Men accompanying the train never rode in the wagons but traveled horseback. Oxen were designated as "bulls," and their drivers "bull-whackers." These bull-whackers walked on the left side of the teams and were armed with whips that were often fifteen or sixteen feet long, attached to stocks measuring sixteen to twenty inches. A driver of a mule team was of course a "mule-skinner."

Ox trains were expected to move forward from twelve to fifteen miles a day, mules going from fifteen to eighteen. Horsemen were always sent in advance to locate camping grounds where there would be water and grazing for the stock. When camping, the wagons were placed so they would form a hollow square. Stock was tethered close by with sentries to guard them. Cooking was done at camp-fires placed outside the square. In case of attacks by Indians the wagon made a formidable barricade. And attacks were common enough. Comanches, Osages, Utes and Apaches all took a try at them, but usually so stout was the defense, the Indians learned, that unless the caravan was weak in personnel and equipment their attempts would be unsuccessful.

While the western end of the journey was usually Santa Fe, some of the traders left the regular Santa Fe trail before its usual terminus and journeyed over the mountains to Taos.

Naturally the day of the arrival of the caravan at its destination was a time of much excitement. Before leaving camp that last morning bull-whackers would put on their most gorgeous raiment, see that their locks were properly

slicked down with bear's grease and their beards handsomely combed, and when, with much cracking of whips and shouting at teams the drivers pulled up to La Fonda, the caravansary in Santa Fe that marked the end of the Trail, the entire population of the town would be there to witness an event that was one of the high lights of the year.

Much of the crowd would be made up of Mexican commoners. There were women whose bare feet gave picturesque emphasis to the brightness of their colored skirts and their gracefully draped *rebozos.* There were town laborers and loafers in faded cotton trousers and shirts. Their feet, too, usually would be bare or sandaled, but always their costumes were crowned by imposing high-steepled, broad-brimmed sombreros. Other commoners—those from outlying regions—were often dressed in buckskin. The *Americanos* present, aside from those connected with the caravans, might be hunters and trappers. They, too, would be in buckskin, more or less worn and not much to boast about in the way of cleanliness.

Mingling with these folk would be Indians; most of them unobtrusive Pueblans clad in compromises between native woven garments and those acquired from their Spanish-tinctured neighbors. Besides these there would be Navajos, bold-eyed and superior, with colorful *serapes* thrown about their shoulders, and a few Plains Indians, with much that suggested the wild animal in their soft moccasined tread and sinuous movements.

In the background, rather aloof, the Mexican aristocrats could be seen—army officers, officials, and the richer land owners. Here the *rebozos* of the ladies would be silk instead

of the cotton of the lower classes. Feet would be carefully shod and the dresses of fine material. Neatly and sometimes colorfully as the ladies would be clad, however, they were quite outdone in the way of raiment by the men. The young dandies, who posed gracefully as they watched the sweating Yankee bull-whackers, were apt to be amazingly gorgeous. Their short jackets were richly embroidered, and those garments as well as their trousers would be gay with silver buttons. About their waists were tightly drawn sashes of silk, on their feet were high-heeled boots and adorning their sombreros were cords and ornaments in silver or gold. Neither Solomon nor the lilies of the field had anything on them as to raiment, and a grandee of the Spanish court could not have exceeded their elegance of manner. And everywhere, in the streets, the plaza and the Fonda patio, there were children, dogs and dust. And everywhere, too, making full-chorded accompaniment to the vocal efforts and the whip-poppings of the bull-whackers, the creakings of the big wagons and the noises of the beasts were strident calls of youngsters, cordial Spanish greetings of the men and the gay laughter of girls. Indeed, so filled was the air with all these sounds, and with the dust as well, that one wondered how there could still be room in it for the robust but not unpleasant odors of cigaret smoke, of many warm bodies and of Spanish cookery.

The first thing in the way of business the arriving traders had to attend to was to pay the customs duties, for the Governor demanded five hundred dollars a wagon, large or small, for the privilege of bringing goods into New Mexican markets.

Afterward preliminaries toward the sale of their goods

to the local merchants would be initiated. These things were not undertaken too abruptly or brusquely. To the Mexican there was no need of haste—time stretched limitlessly before him. A glass of wine first and conversation—perhaps about politics in the States or incidents of the trip; then another glass of wine, introductions to friends who chanced in, an invitation to a *baile* that night where the *cuna* and the *valse despacio* as well as the *valse redondo* would be danced. Then there might be talk of horse-racing and the depredations of pestiferous Navajos, after which goods and prices might finally be allowed to enter into the conversation.

From year to year the magnitude of the trade grew steadily. In 1822 there were seventy men who made the trip to New Mexico, bringing with them $15,000 worth of merchandise. By 1843 the number of men in the trains was 350, and they brought with them merchandise worth $450,000.

A considerable amount of the goods transported over the Santa Fe trail was carried through the City of the Holy Faith on to Chihuahua, Mexicans as well as Americans participating in the traffic.

Until the time of the Mexican War there was no regularly traveled road traversing what is now New Mexico and Arizona between Santa Fe and the Pacific, the New Mexicans taking a trail that went to the northwest and crossed the Colorado river above the Little Colorado or the Grand, reaching California through Utah and Nevada.

In 1846, Gen. Stephen W. Kearny, aided by the diplomacy of James Magoffin, an American who was on very friendly terms with New Mexican officials, occupied, without local resistance, Las Vegas and Santa Fe; taking possession of the country in the name of the United States.

After this was accomplished, following orders from the War Department, with 300 dragoons Kearny started on his famous march to California. Under his command and following soon after, moved the Mormon Battalion, led by Gen. Philip St. George Cooke. The column, which numbered 500 men, was accompanied by a wagon train.

Kearny, with his dragoons, took a trail over the mountains to the head waters of the Gila, and then in a general way followed the course of that river to where it joined the Colorado. The mountainous section was impossible for wagons, but with knowledge gained from American trappers and New Mexicans, it was believed that no insurmountable obstacles would be found in putting the wagon train through the southern deserts, provided they kept south of the route Kearny took at the start.

This opinion proved to be a correct one. After marching down the Rio Grande for a way, Cooke headed his command southwestward into Sonora to a point about fifteen miles north of Fronteras. From there his men marched to the San Pedro, following its course northward until they branched to the west to Tucson.

The New Mexicans at Tucson protested against their coming into their town, but made no active resistance. The battalion, however, only tarried long enough to get supplies, and moved on to the villages of the friendly Pimas on the Gila, near where the Sacaton Indian Agency now stands. After resting for a few days with these kindly natives they continued their journey westward, now directly following Kearny's trail, crossing the Colorado where Yuma was afterward built, and ending their journey at the old mission town of San Diego.

This is the route they took. The difficulties they encountered and overcame, and the adventures they had is another story. We but stretch the canvas and leave to the reader the task of using his imagination as a brush and painting in the real picture.

These men were making a new road through what, to them, was a trackless wilderness. Spanish priests long before had gone over the route and Spanish soldiers had made a trail to California still further to the south, but these things did not lighten the task of the American pathfinders.

Fortunately it was winter and the weather was ideal. The country in summer, as we have already learned, in places can be little less than an inferno.

Somewhat to their surprise, though there were Apaches all about them, the soldiers were not molested. Of course their numbers were a protection, but there was another reason why these raiding sons of the desert made no attempt to harass them. The high chiefs of the tribe knew that the United States was at war with Mexico, and it was learned afterward that many of them hoped ultimately to make an alliance with the Americans, whereby together they could wipe out the Mexicans and divide the spoils!

The great thing they accomplished by the march was that they had marked a trail across the Southwest ideal for winter travel either by wagon or train. Here there would never be inconveniences from snow blockades, sleet or ice; a route, crossing a land indeed, where summer herself spent her winters.

In 1849, in spite of the fact that most of the East was far more interested in the gold fields of California than in America's newly acquired colonies on the Rio Grande, stage

service was established between Independence, Missouri, and Santa Fe.

Indians were hostile and white desperados abounded. Eight mounted guards accompanied the coaches, each armed with two revolvers and a rifle. Besides this every passenger was expected to carry arms and ammunition. At first a stage was put through only once a month, later every week, and finally daily. The fare between the termini was $250, which gave each passenger a baggage allowance of forty pounds.

After the Gadsden Purchase was consummated there was much controversy as to which route between Missouri and California could be traveled more quickly, the one going by Salt Lake to Sacramento, or a southern line that would follow in a general way the road broken by the Mormon Battalion through Tucson and along the Gila River.

In 1855, a California senator, W. M. Gwinn, tried to induce Congress to establish a mail express along the northern route, but failed. Two years later James E. Birch was awarded a contract for carrying mail twice a month between San Antonio and San Diego. The first trip, via Tucson and El Paso, made on horseback, was so successfully accomplished that coaches were quickly installed. Six horses or mules were included in a team with six more behind to be used as a relay.

In spite of delays, infinite discomforts and perils Birch's stages would finally reach their destination. But the time was very slow. Using this line as a link, it would take a month and a half for a letter or passenger to go from St. Louis to San Francisco. Part of the journey was made over a hundred mile stretch that included the sand dunes of the

Colorado River desert in California. Here the road was so bad that in 1858, for a time at least, passengers were provided with saddle mules to carry them over that section. The fare from San Antonio to Tucson was $50 and from San Antonio to San Diego, $200.

To obtain better service, in 1858 the Government awarded John Butterfield, of Utica, New York, a six years contract to carry mail twice a week between St. Louis and San Francisco. The route was 2,760 miles long and Butterfield agreed to have his stages make it in twenty-five days. His compensation was to be $600,000 a year.

Butterfield controlled ample means and knew the sort of an equipment that would be needed to make the venture a success. There were no towns on the road between the Rio Grande and California except Tucson, and so block houses, most of them of adobe, with stoutly fenced corrals adjoining them, were established at intervals for relay stations.

It was dangerous work building them. Insurgent bands of Apaches were continuously on the alert for chances to rob and slay, and as well, there were both Americans and Mexican in the country equally ready to commit murder in carrying out banditry.

Working on a station at Dragoon Springs in southeastern Arizona was a force of three Americans and three Mexicans under an American foreman, Silas St. Johns. One night the Mexicans, bent on looting supplies, killed the American workmen and, two of them armed with axes and the third with a sledge, attacked St. Johns, just rising from his bed. One of them buried his ax in the American's hip, the other axman severed his left arm near the shoulder; but by this

time St. Johns had reached his rifle, and in spite of his desperate condition put his assailants to flight.

Then came three terrible days of agony for St. Johns—tenaciously clinging to the hope that some one would arrive in time to save him, and all the while buzzards and coyotes defiled the dead. On the morning of the fourth day workers on the trail arrived and sent to Fort Buchanan for a surgeon. Six weeks later St. Johns was attending to business as usual. Such were the men of the Butterfield line!

On September 15th, 1858, operating under the name of the Southern Overland Mail, stage service commenced. Six animals were driven, with tough mules preferred. The pace was always as fast as the animals could stand. The longest stage line ever run in America, it was a journey that not only called for endurance on the part of the mules or horses but the passengers as well.

The coaches were Concord-made and hung on thoroughbraces—which are stout leather straps attached to C-springs front and rear. Though this was as easy-riding a vehicle for a rough road as was ever devised, the going was none too smooth at that. Only by courtesy or in irony could the trail they followed be called a highway. Grades were eased into the most precipitous arroyos, bowlders were removed in canyons where passage would be impossible without their elimination, and at this, road-making ceased.

Perhaps stretches of the desert where the ground was encrusted with alkali would cause the passengers the most discomfort. Ruts would be hub deep and the dust would rise like a fog. If the wind was at the stage's back and the pull too heavy for fast going the driver could scarcely see his lead team. And the chuck holes! The road might be

fairly hard and the six animals would be swinging along at a gallop when the wheels would suddenly drop into a hole, two or more feet deep. Like missiles from a catapult every passenger would be shot upward, only to drop with bone-shaking force. And this would go on day and night!

Still these were but mere discomforts and taken as a matter of course. It was the dangers that really counted. Apaches in Arizona, Comanches in Texas, and bandits everywhere along the line certainly did their part to drive ennui from the passengers' lives.

Entire books could be filled with narrations of attacks made on the coaches, and of heroic defenses. We have space to mention a single instance and even here give simply the barest outline.

On a day in 1859, Free Thompson, a noted figure in the Southwest, with five companions was held up by Apaches on a Butterfield stage in Stein's Pass near the New Mexico-Arizona line. There were six hundred warriors in the attacking band under the leadership of Mangas Colorado and Cochise, the greatest Indian leaders of fighting red men the Southwest has ever known. For three days and nights the white men held them at bay, and although it was inevitable that in the end they should be slain, before that happened, as Cochise himself afterwards admitted, they took a toll of 135 Apache lives.

"They were the bravest men I ever saw—those white men," said the chief. "They knew no fear!"

Still, in the face of dangers such as these, the stages continued to run, and not only men but women and children rode in them.

From twice a week the schedule was changed to six times

a week, and the compensation for carrying the mail increased to $1,300,000. At this time the equipment included 1,000 horses, 500 mules and 100 Concord stages. On the pay rolls were 150 drivers and 500 other employees. These men did wonderful work. In spite of Apaches, white bandits, bad roads, heat, sand storms and cloud-bursts when arroyos, dry for most of the year, became raging torrents, the stages were not only kept going day and night but throughout the 2,760 miles, with amazing uniformity, made their schedule. Only three times in its history, it is said, were the mails seriously late.

Yet, good as was the record made by the Southern Overland Mail, there were those who believed that if the northern route were followed, by using a different form of conveyance, letters between the Mississippi and California could be carried much more quickly.

In putting through these ideas, in 1860, the famous pony express was inaugurated between St. Joseph and Sacramento via Salt Lake. The route was 1,950 miles long. When water supply permitted, stations were located every ten miles or so. Messengers, carrying only what mail could be put in their saddle bags, urged their mounts on a keen run. When a rider reached a station he found the agent holding a fresh horse, and while the messenger sprang from the spent to the fresh mount the local man changed the saddle bags. Each rider went forward from 75 to 125 miles, when he turned his pouches over to the next messenger.

The allotted time for the 1,950 miles was ten days. When carrying Lincoln's inaugural address the riding Mercuries made it in seven days and seventeen hours. A wonderful record!

Naturally the Butterfield stages could not compete with such time as this and, horses, mules, coaches and men, it was transferred to the western end of the northern route, the backers of the pony express running stages on the eastern section.

At the beginning of the Civil War the War Department withdrew all its troops from what is now Arizona. The Apaches, believing this to be an acknowledgement on the part of the Government that it was not strong enough to successfully combat them, immediately started in on a red orgy of raiding and murder. Mines and ranches in Arizona were everywhere abandoned, the inhabitants in the southern section generally taking refuge in Tucson, where there were enough white men to insure safety.

In New Mexico conditions were different. Here there were more whites and fewer hostile tribes. Stages were run during this period between Kansas City and Santa Fe with no guard but the usual messenger armed with a Sharpe's repeating rifle and two revolvers. The ordeal of traveling over it, though, was almost as severe as it had been on the Butterfield line. The coaches moved forward day and night and there were always rough roads and dust. Where water could be found stations were but from fifteen to twenty-five miles apart. Between Fort Dodge and Zarah Station, however, there was an unbroken stretch of 110 miles where feed and water had to be carried and an extra team brought along for changes. Thirteen days and six hours of constant travel were consumed in the trip.

Toward the close of the Civil War the territory of New Mexico as a civic unit was divided, its western half becoming the Territory of Arizona. With the reëstablishment of the

military posts, which afforded settlers a measure of protection from hostile Indians, new towns came into being, local stage lines were established and freighters hauled goods, with more or less regularity, both from California and the East.

In carrying the mail, pony expresses were also used where conditions made stage lines impracticable. In 1864, Prescott, the newly created capital of Arizona, sent and received its letters to and from California via the Robertson and Parish express, whose messengers speeded their mounts over a desert road crossing the Colorado River at La Paz. Another pony express from Prescott to California went by way of Mohave.

Mail going eastward from Prescott was carried by military express with cavalrymen as escorts. These routes went through Indian country far more dangerous than that between St. Joseph and Sacramento. Although the carriers of mail were often escorted by mounted troopers, at other times they would go alone. Hairbreadth escapes from hostile Apaches were a common thing. Occasionally they would be attacked by Navajos, Mohaves and Walapais as well.

Even more exposed to the danger of Indian attack were the freighters driving their twelve, sixteen and even twenty horses or mules attached to great Studebaker wagons—a lead wagon, one or two cargo trailers, and possibly a third light "chuck-wagon" to carry supplies. Besides the driver there would be a swamper who rode the wagons and watched the load. In pioneer days he was well supplied with arms, and was continually on the lookout for the possibility of an attack from Indians or bandits.

Usually in Indian country the freighters would go in groups. Sometimes after the Indians had been quiet for a

while, an outfit would travel alone, when the men might pay the penalty of their rashness with their lives. The atrocities committed upon freighters by Apaches almost pass credence. Robbery might be expected, murder as an incident in raiding can be understood, but the way the blood-lusting savages would often torture these drivers and their assistants when they fell into their hands—men against whom they could have no personal animosity—was horrible beyond one's imagination. From one man they cut pieces of flesh as long as they could keep him alive, another victim they pegged out on ant hill, a third they tied to a wheel they had jacked up, then turning him head downward, roasted out his brains. And still other things they did of which a pen may not write, nor concerning which should man read.

All of the large teams were driven with a single rein—the famous jerk-line. The driver would usually have for a seat a saddle placed on the near animal of the wheel team, and the jerk-line would be run through the left bit of each beast. A long, steady pull and the leaders would turn to the left. Responding to a series of short jerks, the leaders would turn to the right.

If the journey was to include a mountain stretch, bells would be fastened to some of the animals' hames so the driver of an approaching outfit, hearing the jangling of the bells before he could see the team, would side-track at a passable place.

However, long teams driven with a jerk-line were not adapted to crooked mountain roads for the reason they could only turn in gradual curves. It is obvious that in turning at anything like a right angle only the last two or four animals could do any pulling. Freighting through broken country

on crooked roads was done with smaller teams driven with the usual separate lines for each team.

It was something of an art to drive a sixteen-animal team with a jerk-line. The first thing to do was to train the team, especially the leaders. It took months, even years, of education to make them properly respond to the drivers' signals, and when they had received their diploma, so to speak, they were priceless. A freighter would about as soon think of selling his wife, if he had one, as to sell a good lead team.

They were usually rather small animals, these leaders, and picked for intelligence and alertness. In the hands of a good driver they would go anywhere they were told, up the side of a mountain, down a steep arroyo, through chaparral—if the driver said "go," that was the law. The wheel team was as strong and heavy as could be found.

Speaking generally it may be said that a real driver always took the best of care of his stock, looking carefully after their feed and water; never, if possible, overdriving them; seeing to it that they were properly shod and that their collars fitted so there would be no neck galls or sores. But if in the outfit there was a horse or mule that could pull and would not—a shirker—woe to him! It was then that a driver would earn his title of mule-skinner. Every time he would hit the beast with cruel whip or trace chain he would call its name with the explosive force of a rifle crack. When the terrible ordeal was over and the animal was back in place it was seldom when that name was called with its blow-like emphasis, that the animal did not surge forward to his task.

Yet a mule-skinner was not continuously beating up his

team nor even continuously hurling sulphurous verbal bombs at it. His highest powered shells, so to speak, were kept as reserve ammunition for emergencies. It was something well worth witnessing to see a master driver start out his long string of animals in the morning. After the beasts were all hitched in place and ready to go he would begin talking to them, sprinkling in affectionate cuss words in a friendly, encouraging way, calling the different ones by name. Gradually his phrases would grow more and more staccato until the dull as well as the naturally alert beasts would all be emotionally on their toes. Then like the command of an army officer to his men, the word to march would be barked out and with it would come the explosive crack of the whip. Sixteen beasts as one would lunge forward against their collars, the wagons would groan with the strain, and the outfit was off.

The gait would be slow, not over three miles an hour. Slow enough so that for much of the time the driver would walk beside his wheelers, a dust-covered figure with his inevitable blacksnake looped about his neck.

In size the wagons were tremendous. The lead would carry from four to five tons of freight, the trailers from three to four. The tires of the lead might be six inches broad. If necessary the outfit could make its own trail as it went along, and when it had passed there was a well-packed road. Fifteen miles was considered a day's journey.

In a grass country the animals would feed nights under the direction of a herder, or "wrangler," as he was called.

A four- or six-horse or mule team, if not loaded too heavily, would go farther in a day than the larger ones—perhaps twenty miles.

Although the completion of the Union Pacific Railroad in 1863 had given the East a rail connection with California, the Southwest was eager to have a transcontinental line of its own, appreciating the immense advantage it would be in developing local resources. Railroad directors and executives, too, were as anxious as local business men to see lines brought into this great section so rich in minerals and, as well, in spite of its desolate-looking deserts, in its agricultural possibilities.

In 1878, the Southern Pacific, building eastward, reached Yuma, and on March 17, 1880, when the road had been completed as far as Tucson, there was a great celebration in the old Spanish pueblo to mark its connection by rail with the modern world. From Tucson the line was extended without delay as far as Deming, New Mexico.

Meanwhile from the northwest, building in a general way along the Santa Fe Trail, came the Atchison, Topeka and Santa Fe, the first passenger train reaching Otero, in the northeastern part of New Mexico, in February, 1879. By April 22, 1880, Albuquerque was reached, from which point, under the name of the Atlantic and Pacific, the line was pushed westward to California. But before that was consummated a line was built southward from Albuquerque which reached Deming March 10, 1881, where, connecting with the west division of the Southern Pacific, through connection with the Pacific Coast was secured, and the southern transcontinental road, free from the inconveniences of winter snow and ice, which statesmen at Washington had hoped for when the Gadsden strip was purchased from Mexico, had become an actuality.

Although these great steel highways were followed by

other railways, stages continued to run through isolated sections of the Southwest for years. In the '70's, and later, coaches ran between Tucson and Sonora points, and in the '80's an extensive business was done both in passengers and express on the Tucson-Tombstone line.

Parenthetically, it may be mentioned that the stages on this second-mentioned route were held up with exasperating frequency by efficient road agents acting, so old-timers allege, under the protection if not under the actual direction of the town marshal and a United States deputy marshal in the city with the cemetery-suggesting name.

In some cases back-country stage lines continued in operation until the old horse vehicles were replaced by modern motor stages and trucks, which are still doing business.

One would scarcely suspect that navigation could have a part in the story of transportation in the Southwest, yet a part it had and a rather important one. From 1852 until 1879, California travelers bound for the Southwest could, at Pacific ports, take a boat, which, rounding Cape San Lucas, would make its way up the Gulf of California to some convenient harbor like Port Ysabel, where it would be met by light river steamers and a transfer for towns on the Colorado River could be made.

At Yuma, first called Colorado City and then Arizona City, passengers for Tucson would disembark and freight for that town be unloaded, while people and freight for Wickenburg, Prescott and other central Arizona points would be carried on to La Paz or Ehrenburg.

Still farther up the river, 337 miles from Yuma, the hamlet of Hardyville was usually considered the end of navigation, although one steamer made occasional trips to the

mouth of the Virgin River, a considerable distance still farther north.

Traveling up the Colorado had its thrills and discomforts as well as did stage travel. During the early summer, fed by melting snows at its far-away source, the lower river runs bank full and even breaks over. For the rest of the year the waters subside to a sluggish and almost shallow stream, with protruding sand bars. To be stuck for hours at a time on one of these bars seemed to be an inevitable incident for most of the boats making late summer trips. With the thermometer registering 120 or so—if the boat management permitted a thermometer on the boats, which is to be doubted—and with the reflection of the sun on the muddy water and the heat of the engine room added, the discomfort induced might almost equal the joltings and dust of the hurricane deck or the cabin below of a rocking Butterfield Concord.

An attempted innovation in Southwestern transportation before the Civil War, is concerned with the experiments the War Department made with camels in that section.

It seems that it was Jefferson Davis, then Secretary of War, who first conceived the idea, and on a morning in May of 1855, Maj. Henry C. Wayne was started on a journey to the Levant to pick up a few promising specimens in the camel line.

There was a multitude of silver-tongued Sons of the Near East who met the Major with offers to part with some of the priceless bactrians and dromedaries of their herds for a fair consideration. But it seems that a Yankee horse-trader is the very epitome of guilelessness compared with these swart-faced dealers in camel flesh, so, after acquiring a few

moth-eaten, horrible examples, the Major became decidedly camel-wise, and getting rid of his first buys he finally succeeded in purchasing thirty-four really fine animals and, as well, engaged the services of two expert drivers, "Hi Jolly" (Hadji Ali) and Greek George, to valet them.

Not only did the Major get his stock safely overseas, but when they were landed on the Texas coast the number of the herd was forty-one, seven of his original purchases becoming mothers on the voyage.

At first it looked as though the experiment was to be a roseate success. Lieut. E. S. Beal used some of the beasts on a wagon road survey in Arizona and was enthusiastic over their record. They could carry from 700 to 1000 pounds each, and while they would become more than peevish when things did not go to suit them, if properly handled were fairly tractable.

A notable item in their favor was the fact that contrary to expectations they were not at all finical about their feed, doing quite as well on browse as on grass, and showing a special fondness for mesquite leaves and beans.

But this was the credit side of their ledger. With many army officers they were not at all popular. Debited against them was the fact that Hi Jolly and Greek George were about the only members of the local camelmen's union who could ride the beasts without becoming ill or being tied to their saddles.

The soldiers, used to rough-and-ready methods with army mules, resented that the temperamental camels should demand something better, and became decidedly hostile when the beasts attempted to bite holes in them in retaliation for inconsiderate or ungentlemanly treatment. And that

resulted in the hostlers forming a habit of cutting picket-ropes and letting their charges escape to the desert.

A more serious defect in the camels was that their feet grew very tender upon stony roads and all traditions to the contrary, they didn't seem to be able to go much farther without water than a mule.

However, with all that, camels might have become a permanent asset in transportation circles of the Army had not the Civil War come on, which ended so many enterprises in the Southwest, and gave the War Department all it wanted to do without continuing its experiments in hump-backed Oriental baggage carriers.

The beasts were kept until 1866, when the herd passed into private hands, and was taken first to Nevada and later to Yuma. Soon afterward the owner died, and the camels were turned loose on the desert, where for years they haunted the sun-baked plains of the lower Colorado River.

Here they speedily became objects of deep and abiding loathing to prospectors and drivers of freight wagons and stages. Horses, mules and burros alike were terror-stricken at the sight of them. Burros, with heavy loads on their backs, moving liks snails under the tropic sun, when a camel unexpectedly chanced in sight, would take on the speed of a race horse. Mules attached to freight teams would bolt madly when these weird beasts suddenly appeared, scattering articles of merchandise for a mile or so along the way. Not unnaturally teamsters took to pot-shooting camels at every opportunity, and only a remnant of the band, haunting the most sequestered spots of the desert, long survived.

From Tucson to Los Angeles, either by rail or automobile, as the roads now run, is a little over five hundred miles. In

the '50's it took a covered wagon with oxen about forty-two days to make the trip. A sixteen-mule freight outfit in the '70's accomplished it no quicker. A good four- or six-mule team, with not too heavy a load, might be pushed through in a month. A pack train of mules, at the usual rate of going, would also consume a month on the trip, but on a forced march might cut the time down to eighteen or twenty days. At the average speed a Butterfield stage traveled, and not stopping nights, the journey's end might be reached in about four days. The pony express would eat up the mileage in three days and two nights. All these figures assume traveling conditions to be ideal.

Nowadays, with a motor car, if the driver takes things easy, he may go from Tucson as far as El Centro the first day, stay there over night and reach Los Angeles the next afternoon, or, if he is in a hurry, he may put his car through in one long day.

In yesterday's evening paper there was a small item—for the event chronicled was commonplace—that some aviator had hopped off from Tucson with his plane after breakfast and reached Los Angeles in time for luncheon.

We moderns certainly save a lot of time the old pioneers traveling in wagons and stages lost. What do we do with it? We seem to be even busier than they and accomplish little if anything more. We have more luxuries and lead softer lives than they did, but do we get more real joy our of living? I wonder——

CHAPTER XXXV

LEGACIES OF SPAIN

MEMORIES and traditions of the old days when the Southwest was first a province of New Spain and then part of the Mexican Republic lie over it in a golden haze. Looking back through the vista of years our fancy catches glimpses of such things as señoritas, with dark eyes and alluring lips, smiling through grated windows at lovers who tunefully strum their guitars; or perhaps of intriguing groups of officials plotting and counter-plotting in rooms of the Palacio at Santa Fe, or of a lone rider fleeing from pursuing Apaches, or a valiant band of cavaliers fighting a Pueblan army.

Doubtless these New Mexican pioneers (and New Mexico of course included Arizona) had days when Adventure limped slowly and Romance took an afternoon siesta; days when the background was squalid and the actors played unheroic parts. But with most of us the cinema of the mind rejects such commonplaces, and if there is no longer allurement enough left of those bright times to stir the blood of the minority, perhaps it would be well for such to consult a physician. Hardening of the arteries and other forms of approaching senility have a way of creeping upon a person unawares.

Here in the Southwest reminiscences of those colorful days are retained in many ways. They tincture our architecture, our cookery, our language and our customs. More than

that we have for our neighbors the descendants of these people, as good Americans as any of us, but still temperamentally much the same as were their fathers.

Both in the yesterdays and in the to-days Mexicans have been rather sharply divided into classes, the aristocracy, those of a middle stratum, and the commoners. The aristocrats, for the most part, although not always, are of pure European descent, the middle class is made up usually of those who have mingled in their veins the blood of the white man from across the seas and that of such native tribes as the Aztecs or "Toltecs," while the servant class, oftener than not, is almost, or quite, pure Indian. And just as the people who form New York or San Francisco smart society are not alike, and all the members of the Chicago bricklayers' union were not turned out of the same temperamental mold, so in all the strata of Mexican life we find those who are kind and those who are cruel; industrious ones and lazy; mentally bright and mentally stupid. Still the members of each class are far more like one another than they are different and they all vary so much from the average citizen of the States that they never fail to arouse our interest And strange as such matters always seem to us these differences are not always in our favor.

Certain things we are willing to admit we do better than they. Such, for instance, as governing a country. But then this chapter is not going to be about statecraft, but rather of their manners and habits at home and with their friends—as they lived in Santa Fe, Albuquerque and Tucson in the first half of the nineteenth century, and as they live now all over the Southwest.

In the old days even the grandest lived in houses that to

us to-day would seem poor and bare enough. They scarcely could have been otherwise. Sawmills were unknown, carpenters and cabinetmakers were few in number and those not greatly skilled. What boards and small dimension lumber they had were sawed by hand. Larger timbers were shaped with an ax or adz.

Practically all houses were of one story, with walls of adobe. Their flat, slightly pitched roofs were made with beams, or *vigas,* of rough-hewed or unhewed poles supporting a layer of straight sticks laid close together. Above these would be a thickness of straw or brush covered with well-tamped earth. If kept in repair this roof would shed rain quite satisfactorily.

Inside, walls were plastered. Sometimes they were treated with a sort of a whitewash and covered, wainscot-high, with cloth. *Vigas,* doors and window-blinds were occasionally painted. Blue was a favorite color. The floor was simply the earth packed hard.

Houses of poorer folk might consist of but one or two rooms, although in building there was little expense beyond labor, which could largely be supplied by the family itself. Dwellings of the rich were often built around two or more sides of a courtyard or *patio* with arcades or porches facing the same. Walls of adobe formed the other boundaries. Here there were usually vines and flowers with a second yard to the rear upon which opened sheds for domestic animals.

The windows of the house were innocent of glass. In more pretentious dwellings such openings would be screened with iron or wooden bars and provided with wooden shutters for protection against the elements.

Within the houses there would be no furniture other than homemade pine tables, benches and chairs. In the place of dressers or chiffoniers, chests, sometimes covered with rawhide and quaintly ornamented with figures, were used to hold wearing apparel.

Bedsteads were an almost unknown luxury. The first brought to Tucson was viewed as a marvelous spectacle, people traveling a day's journey or farther to see it.

Beds were made up on the floor and consisted of mattresses with blankets or skins thrown over them. In the better houses, during the day the mattresses were folded and laid against the walls and, when covered with Navajo or native blankets or skins, became settees.

The dirt floor was sometimes partially covered with a rough home-woven rug or carpet. Walls were adorned with prints of the saints, the one most frequently seen being that of our Lady of Guadalupe, the patron saint of Mexico.

In the better houses, lacking stoves, the rooms were heated by a small corner fireplace. Cooking was done on a *hornilla,* which may be described as an open hearth laid either on the floor or built up two or three feet high. It was made of clay and consisted of one or more compartments, each about a foot wide. When there was more than one of these sections they were divided by clay walls five or six inches high, with space between for the fire beds. Some of the compartments might be covered by a metal grill, and one unit always had an earthenware plate—a *cornal*—over it upon which cakes were cooked. Smoke escaped through a hooded hole in the roof. In a one- or two-room hut of the poor the *hornilla* would be used for heating as well as cooking. Baking and roasting

were done at an outdoor dome-shaped oven, made of adobe. Cooking utensils were usually of earthenware.

The range of edibles for all classes was much more restricted than ours. For vegetables they had chilies, onions, garlic, *garbanzos* (chick peas). They had no potatoes until about 1830, when they were introduced from the States. (Although potatoes were indigenous to Peru and other countries of South America they seem to have been unknown to the aboriginal Mexican.)

Fruits were a luxury. A few peaches, apricots and apples were raised where climatic conditions were favorable. Grapes were grown on the lower Rio Grande, and wine and brandy were made. Corn and *frijoles* (pink beans) were staples.

Agriculture was pursued most primitively. The only plow the farmers had was made out of a section of a trunk of an oak, with a small branch left attached, to be used as a handle. Wooden hoes and shovels were used until steel ones were brought in by Yankee traders over the Santa Fe trail. In most places crops were grown with the aid of irrigation.

The Mexican colonists took much more naturally to stock-raising than to gardening. Cattle, sheep and goats grazed on the hills; there were chickens in the *patios,* and perhaps a few pigs near by. In addition to the meat thus supplied, wild game was plentiful.

Town folk could buy their table supplies direct from the producers, who would bring them to town and sell them at the inevitable plaza.

The universal form of bread was the *tortilla.* This was an unleavened corn pancake flattened with much spatting

between the hands and cooked on the earthenware plate on the *hornilla.*

Common dishes were *chile con carne* (chili with meat), *chile con huevas* (chili with eggs), and *enchiladas,* cheese rolled inside a *tortilla* and perhaps served with a chili sauce. The *tortilla* was not only used for food itself but as a spoon in the consumption of semi-liquid foods. Corn for this cake was prepared by soaking it in weak lye-water which removed the hulls, the kernels then being dried and ground on a *metate.* This is a flat oblong stone upon which grain is placed and reduced to meal or flour by being vigorously rubbed by a kneeling woman armed with a hand-stone approximating the shape of an enlarged cake of toilet soap.

The apparel of the poor, while of the simplest, always had a suggestion of the picturesque about it and often a touch of color. The aristocrats clad themselves elegantly, and upon festival occasions quite gorgeously, balancing the poverty of their house furnishings with the richness of their raiment.

But what impresses us most about these interesting times is the people themselves. In spite of the primitive conditions under which they lived, their days seemed to contain much gaiety and genuine happiness. They appeared unconsciously to have adopted something of the Buddhist philosophy: why should one make himself miserable by fretting over that which is difficult or impossible to attain when by setting himself to it he can learn to enjoy that which he has at hand; although in the case of the New Mexican no self-discipline seemed necessary—he took simple pleasures as they came and made the most of them.

Music and the dance were things that any with attuned ears and sound legs could enjoy. A room fourteen feet or so

wide and twice that long, even though it had but a dirt floor, was lighted by candles and furnished with nothing better than pine benches, made a commodious and sumptuous ball room. As for an orchestra, they had something that neither opulence nor modernity could improve. Violins, a harp and guitars played by Mexicans born to music and rhythm, invoked as fine dance music as the world has ever heard; music that makes present-day jazz sound like the cacophony of a charivari.

Not only were there many private dances given to celebrate occasions like weddings and saints' days, but in such places as Santa Fe semipublic dances were held almost nightly, the musicians often playing through the streets beforehand as an advertisement. After the dances the young *caballeros* might employ the orchestra to go serenading with them.

In pioneer times everybody gambled. Even age, a wooden leg or a deaf ear were no bars to that. To run a gambling parlor was a wholly respectable pursuit, and the patrons of the place included every one who had a doubloon, a *real* or a few *centavos* to hazard—governor, alcalde, army officer, priest, high-born doña and low-born daughter of a peon. Many different games were played, but *el monte* was the favorite.

Practically every one, too, rode horseback. In addition to horse racing there were a variety of equestrian sports. A favorite one was to bury a chicken in the ground, leaving only his head and neck exposed, when a rider, going full tilt, would lean over and try to lift the poor creature by the head. Catching a bull by the tail and throwing him was a more robust outdoor diversion, while a sport that

required more daring on the part of the feathered performers than of the human spectators was cockfighting.

The common people during Spanish rule in New Mexico had no part in their government. Nor, after Mexico secured her independence from Spain, under the Mexican emperor between 1821 and 1823, or subsequent to that date under the Republic, did they have any more. Perhaps it was just as well, for it is extremely doubtful if they could have taken a very intelligent part in directing state affairs, had the privilege been granted them. It requires not only natural intelligence but knowledge and training to make a competent citizen of a republic.

Outside the pages of a Jules Verne or an H. G. Wells it would seem a good deal of a task to make a personal visit into the past, yet by keeping off the beaten path, if one should journey down the west coast of Mexico, with each two hundred miles he could turn his calendar back a century —certainly so far as most of the habits and customs of the lower classes are concerned.

A railroad official from the New England States was visiting a superintendent of construction on the Southern Pacific of Mexico railroad in Sinaloa. Voicing his indignation at the way elections were held in the southern republic he said, "I understand that not one laborer in a hundred down here ever votes, and even then probably his vote is not counted. This is a democracy; these men know what they want and are entitled to have political leaders of their choice."

The local railroad man grinned sardonically. "Sure they know what they want. To-morrow is Sunday. Let's have a little play election for *presidente* right here among our own

workers. There are two hundred of them. Let's see what they would do with the franchise if they really had it."

The matter was explained to the workers through their foremen, and everybody, foremen and laborers alike, entered into the matter with whole-hearted zeal.

The New England visitor smiled approvingly. "This ought to be an object lesson in good citizenship to all of Mexico. These men know exactly what they want."

"Sure they do," repeated the superintendent.

The ballots were cast and counted. The tally sheet was long retained by the superintendent as an illuminating document. Five of the men had voted for Miguel Hidalgo, hero of the revolt of Mexico against Spain nearly a century in the past. Two had voted for Benito Juarez, another dead-and-gone hero. There was also a ballot for Porfirio Diaz, and a few for some of the local foremen. All the rest, with fine enthusiasm, had been cast for Juanito, the matador, who at the last bull fight in Culiacan had most debonairly slain five *toros.*

The Spanish pioneer was religious, and his religion played an active part in his everyday life. He was baptized, confirmed, went to confessional, and said his prayers regularly. When he was thanked for a kindness or a gift he would likely reply, *"A Dios sean dadas,"* (To God be the thanks). When a friend left him his parting salutation would be, *"Vaya con Dios,"* (Go with God). He frequently christened his children Jesus, Angel or Serafina, while his towns he might call City of the Holy Faith, the Holy Cross or in commemoration of the saints.

And safe within the church, salvation being secure, his religion was no gloomy affair nor his Sunday a day of

austerity. A Scotch Presbyterian would have understood neither the religion nor the man. Most of all the light-hearted merrymaking of these people on the Sabbath would have horrified Sandy. Nor could they have understood the Scotchman. Why should one's religion be long-faced or a Sunday be made doleful? Religion was a joyful thing and should be celebrated colorfully. On Sunday when mass was over the day should be enjoyed to the full, as they felt sure the Blessed Trinity, the Virgin Mary and all the saints would wish it. So from mass they went to the cockfight, from the cockfight to a good dinner, from there to a little contest to settle which of two wiry bronchos could run the faster, then after a little more to eat, to a *baile*. No, a Scotchman would not have understood it at all.

No picture of the Mexican pioneers of the Southwest would be complete that did not emphasize their kindly and unfailing courtesy. This is true of the laborer, the shop-keeper and the grandee alike. Intriguing they could be, remorseless in dealing with an enemy and at times cruel, but of their kindly attitude toward each other in their homes, with neighbors or with strangers, of their spoken courtesies and unaffected good manners, one can speak only in terms of highest commendation.

Nor were these simply hollow forms; they came from the heart, inspired by kindly and hospitable impulses from within. Although, perhaps, to be quite modern we should express this same conception another way. Psychologists now tell us that one does not do a kindness for a person so much because he previously likes him, but that he grows to like him because he is kind to him. The act inspires the feeling rather than the feeling the act.

In the home, parents were always honored and old age treated with deference. In speaking Spanish, adding the diminutive to names and certain nouns is done usually not to indicate physical smallness but to express endearment. Thus Anita is not little Ana, but dear Ana. So, even though mother might be fat she would be *mamacita* to her sons and daughters, while they in turn would be *linditos,* dear pretty ones. Women friends, untroubled with knowledge of such things as germs or microbes, universally greeted each other with kisses; and the embrace, coupled with affectionate patting of the shoulder, was as common with men greeting their masculine friends as it was with women upon meeting acquaintances of their own sex.

The first people from the United States seen by the pioneer New Mexicans on the Rio Grande were hunters and trappers and the Santa Fe traders. The next arrivals were soldiers of the American army during the Mexican war. These were for the most part volunteers from the back country of Missouri, Arkansas and Texas. Brave men, they were, resourceful and great fighters, but for the most part as uncouth, loudly boastful and bullying a lot of swaggerers as ever brought discredit upon a race or country. To the cultured New Mexicans they must have seemed much like the Goths and Vandals did to the ancient Romans.

A large part of the unskilled labor of the Southwest to-day is done by the Mexicans of the lower class. One sees them in section gangs on the railroads, on automobile highways, in mines and on ranches. They do well at all kinds of farm work except, usually, that which involves a knowledge of machinery. Inured to hot weather by natural selection through many generations they labor without serious dis-

comfort under a summer sun hot enough to cause extreme discomfort if not prostration to the average northern white man. Some of the work they do, such as shoveling muck out of irrigation ditches, it would be practically impossible to find a white man to undertake. They are especially skillful at irrigating, handling heads of water without waste and with economy of energy. Entire families work at picking cotton, and the parents and often the children themselves resent the action of the truant officer when he compels children between eight and fourteen to attend school. In the trades one finds few carpenters among the Mexicans, but a good many of them learn plastering, bricklaying and blacksmithing.

Among the middle class are found barbers, clerks, shopkeepers, professional musicians, drivers of motor trucks and the like—a wide range of occupations.

The Mexican laborer has often been accused of downright laziness, but he is improvident rather than hopelessly indolent. If you put a Mexican laborer and a white man side by side on a job like hoeing weeds the former usually will work the more steadily. But it irks the Mexican to labor when he has money. It seems so illogical.

There was the shoemaker in Guaymas. A Gringo with a pair of shoes to be repaired pauses in front of his tiny shop, wakes the *zapatero* who sleeps peacefully at his bench, and explains his errand. The Mexican yawns, looks reflectively at the shoes, then turning, calls through the curtain that divides his place of business from his residence. "Carmencita, my love, how much money have we in the pocketbook?"

"Dos reales," (twenty-five cents), comes the answer.

With a magnificent gesture the *zapatero* returns the shoes. "Señor, we do not need the work. We have money."

Kindly manners and graceful speeches are still prominent characteristics of our Mexican-Americans. Contact with the rough and ready personality of the American section foreman and mine boss have rather chilled outward expressions of native courtesy with the manual laborers when mingling with unsympathetic aliens, but when working for a *patron* who understands them, the old traits are still conspicuous. In a way these people have an instinctive feeling for their "boss" that a medieval vassal might have had for his overlord. They want a *patron* who can protect them and tell them what to do as a father directs his children. To such a one they not only give their courtesies but real loyalty as well. They might steal from him in a conservative fashion, but they would not let any one else do so. I know a Mexican man and wife working for an American *hacendado* on an Arizona cattle ranch, whose *patrones* are the sun, moon and stars to them.

They would, I believe, risk their lives in his service and even more willingly commit manslaughter in his behalf. As to their manners, though neither probably wore shoes until they left Sonora for the States, both in speech and action they might be graduate pupils of a Spanish Chesterfield.

In writing of the upper-class Spanish American of to-day one may say that all that is best of the customs and courtesies of the past have been retained. Their home life is ideal. The attitude of one member of the family to another is a beautiful thing, and as we have said else-

where the brusqueness of a materialistic modern age has not marred their courteous bearing nor have impositions dulled the fine edge of their hospitality. The accommodations of a home may be limited and the table be meager, but the best of what they have is for the guest.

CHAPTER XXXVI

MINES AND MINERS

SEVERAL years ago I was with a party that was visiting the Inspiration Copper Mines and the International Smelter in central Arizona. A distinguished member of our group was Mr. John Galsworthy, the English dramatist and author.

Under the guidance of Mr. T. H. O'Brien, the general manager of Inspiration, we had watched the ore being brought up from the depths of the earth—enough to fill twenty-three railroad cars every hour. We saw the ore being crushed by an ingenious arrangement of steel balls revolving in huge cylinders; saw the copper being separated from the waste in the ground pulp by the marvelous flotation process; saw molten metal poured from converters into steel ladles holding fifteen tons or more; saw great cranes swinging more vatlike ladles of incandescent metal through the air above us; saw the refined copper itself pouring out of the furnaces in a fiery stream and running in scorching, glowing rivulets into molds where it quickly hardened into slabs; saw sweating men everywhere in the lights and shadows of the great place working swiftly and with amazing skill, handling all this mighty machinery as gods might direct the ordering of the suns and planets in the cosmos.

From such scenes of Titanic activity we had gone into a

room filled with intricate machinery. Indicators were showing the movements of all the hoists of the mine; automatic devices were recording the tonnage of ores moved. The various mechanisms, we were told, were among the most wonderful in the world.

While the others were full of questions about dials and levers, Mr. Galsworthy, I noticed, was gazing preoccupiedly through a window at a group of buildings on the hillside. I suggested to him that if there was any feature of the work in which he was specially interested, that we had missed, Mr. O'Brien undoubtedly would be glad to arrange for him to see it.

"It is marvelous the things these men are doing," said Mr. Galsworthy. "I was thinking about the miners—the chaps who work underground—and wondering if we couldn't get a little more intimate view of them. One of the shifts is changing now. Let's go out and watch the faces of the men as they come from work."

That was the big thing about the mine for him—the men who directed the machines, the men who handled the picks and drills and shovels. Mr. O'Brien, the man, the director of it all, interested him more than did his hoists and cranes; an assayer and chemist with whom we had talked, more than did his crucibles and test tubes; the men who took the ore out of the ground, more than the copper itself.

His point of view suggests a starting place for our chapter. Let us consider the human element in mining in the Southwest.

The earliest delvers in the earth here, naturally, were the Indians. Elsewhere in America, as in the Lake Superior country, they mined some native copper and, by beating it

out with stone hammers, fashioned it into simple artifacts. Certain tribes in both Mexico and Central America obtained gold from quartz and river sands. They were also familiar with copper and silver, treating ores by pulverizing and washing, or by roasting. Occasionally they employed fire in working the mines. Mayans converted copper into wire, and then made tiny bells by coiling it into shape and fusing it into a solid piece. Gold was used in different ways, in making solid ornaments and for plating.

In our Southwest, the mining operations of the Indians were confined to digging out ochres and other coloring materials for adorning their dwellings, their artifacts and their persons, and to separating turquoises, jet and other semiprecious stones from adhering rock. Possibly, also, pieces of native copper may on rare occasions have been found in such deposits as those at the Santa Rita, and crudely fashioned into usable shapes.

We have already seen how unsuccessful Coronado and his men were in their quest for precious metals. For many years, in what is now New Mexico, the Spaniards who came after him fared but little better. Not until the beginning of the nineteenth century, indeed, do we find any accounts of mining in this section. However, in present Arizona, over a hundred years earlier, soon after the Jesuits began to establish missions along the Santa Cruz, we learn of gold, silver and somewhat later of copper mines being discovered and worked.

Whether the Jesuits themselves had a part in these operations has long been a disputed point among historians. Some assert that neither they nor the Franciscans who came after them, did any mining at all; others would have us

believe that the working of metals was prominently engaged in by them.

The evidence shows that there was a smelter at Tumacacori. When it was constructed is unknown, but as it was still in fairly good condition when seen by Americans after the Mexican War, if it was built as far back as the time of Jesuit administration, it was also used during the Franciscan period as well. There are traditions, also, that the friars here discovered rich silver mines in the Santa Rita Mountains to the northeast of the mission and in the Atascosa Mountains to the southwest. These, so accounts run, were worked by Papago laborers, under the direction of the friars, and included the Salero mines, where remains of their work may still be seen. There are no records of any minerals being worked at San Xavier or Guevavi.

There is a tradition that when the friars were forced to leave Tumacacori they buried in its patio millions of *pesos* worth of gold and silver bars. It is estimated that if all the digging about the place done since by fortune hunters had been devoted to vegetable gardens, enough potatoes, onions and chilis might have been raised to supply the Southwest from Spanish times to the present. As it was, the recoveries have netted one broken mission bell and a dozen or so cases of lumbago.

The friars, of course, were also glad to encourage others in their mining operations, and as early as the closing years of the seventeenth century the erudite Padre Kino, whose knowledge of mining seemed to be only second to his skill as an agriculturist, wrote to his superiors of the country's abundant mineral resources.

Here, stimulated by such reports, Spanish prospectors soon

began coming in, and we learn that as early as 1726 numerous mines in the mountains both east and west of the Santa Cruz had been located and were being worked.

One of the most important of these discoveries was at Arizonac, southwest of Guevavi, and just south of the present Arizona line. This was the famous Planchas de Plata, where native silver was found in huge plates or balls; one immense lump, it is said, weighing nearly 3,000 pounds.

By the beginning of the eighteenth century, Spanish white men had been on the west coast of Mexico for over a century and a half. Many of them had mated with Indian women, and the part-breeds that are now conspicuous among the Mexican middle class had begun to take their place in the stratum between the European aristocrats and the full-blood Indians. Certain native tribes had become Mexicanized; that is, they had learned to speak Spanish, had assimilated some of the white man's customs, and were becoming the laboring class of the country.

While these Indian laborers were disinclined to work, except when hunger or other urgent necessity pushed them, they were usually physically strong and, when disciplined and directed by their overlords, capable of much hard work.

As a means toward securing a dependable supply of labor, these people were held in a state of peonage, which practically differed from slavery only in that a *peon* could not be sold. A *patron* would pay a man a small amount out of which he was supposed to support himself and his family. As the amount was always too small to cover his necessities he would be encouraged to buy supplies at the *patron's* store, where he was always assured of "conservative" credit. The law and custom provided that a servant could not leave a

master so long as he was in debt to him. As it was impossible for him to liquidate what he owed, he and his family remained in servitude all their lives. Should a *peon* attempt to leave, a warrant of debt served by an officer could always bring him back.

Although not generally known, it is a fact that New Mexico after it was a part of our own country, under the title of a "Law Regulating Contracts and Servants," permitted peonage until, in 1867, it was abolished by Congressional action.

In Spanish colonial times the directing of the working of a mine was naturally in the hands of Spaniards or half-breeds, but the actual labor of taking the ore from the ground was done by *peon* natives. They worked hard. We read accounts of mining operations in the country farther south where the naked, sweating Indian, at the bottom of a shaft would break up the ore and shovel it into sacks or *bolos* of bullock hide to the weight of from two to three hundred pounds and then climb ladders up from one to five hundred feet to the surface. Even in the case of the greater depths several such trips would be made in a day.

There was plenty of hard work to be done above ground as well as below and some of it was doubtless engaged in by masters as well as servants. Trails had to be made over which the ore would be packed on the backs of mules or burros. Trees were felled on the higher mountain slopes, fashioned into timbers with adzes and transported to the mines with the same motive power that carried out the ore.

After free-milling gold ore had been taken from the shaft it was reduced to powder in an *arrastra.* This ingenious contrivance may be likened to a great tub, ten or twelve feet

in diameter, with slabs of basalt for the bottom, and also with rock sides. Rising from the center of the tub, or vat, would be a shaft turning in a socket set in a pedestal, with the other end socketed in a crossbeam at the top. Lashed to the shaft were two spars crossing at right angles, one of them long enough for a team of mules to be hitched to it.

A layer of ore would be laid on the rocks that formed the bottom of the tub, and above the ore four large stones would be laid, dragging from the sweeps, to which they were attached by leather thongs. Water would be poured into the vat and the blindfolded mules started on their endless encircling journey. The ore, kept continuously wet, in time would be ground to a paste between the upper and lower stones. By changing mules, from 300 to 400 pounds might be so ground in twelve hours. The metal would then be recovered by washing. Silver and copper ores were roasted in crude adobe smelters.

From 1726 on, the number of small silver and gold mines in the territory that afterwards was to be known as the Gadsden Purchase steadily increased until, on November 21, 1751, for several years all mining operations were suddenly halted by the revolt of the Indians against Spanish rule.

A map, accompanied by extensive notes, made in 1757, gives the names of more than one hundred gold and silver mines that were then being worked in present Arizona and Sonora. Other mines, at the same time, were being operated in Chihuahua.

The Ajo copper mines, in southern Arizona, were known to early Spanish prospectors, but the ore was of such low grade that it could not be profitably worked.

While the Indians seem to have had knowledge of the

Santa Rita copper deposit in New Mexico in prehistoric days, it was not until 1804 that a native told a Spanish officer, Lieut.-Col. Manuel Currasco, of its existence.

Other copper indications seem to have been noticed by the Spaniards in various places in the Rio Grande country at an even earlier date, as in 1794 Governor Chacon, writing from Santa Fe said, "Copper is abundant—apparently rich, but no mine is worked."

Lieut. Z. O. Pike, writing of the resources of New Mexico, on his notable visit to that Spanish colony in 1807, said that the only mine then being worked was one copper mine —evidently referring to Santa Rita.

Although there never was any historical data to base it on, there was long a tradition that the friars of some of the New Mexican missions as well as their Arizona brothers had been interested in mining, and that in the church yard at the Gran Quivera gold dust to the amount of three million *pesos* had been buried. Although treasure hunters have dug here as industriously as they did at Tumacacori not a *centavo* worth of treasure has ever been recovered.

Soon after the United States, in 1853, by virtue of the Gadsden Purchase, had acquired the territory lying between the Gila River and the present International Boundary, American prospectors began entering the country. One of the earliest of these arrivals was Charles D. Poston, afterward Arizona's first delegate to Congress.

The old Mexican military town of Tubac, on the Santa Cruz, 22 miles north of Nogales, had been abandoned by its inhabitants, and Poston, with Herman Ehrenburg, a mining engineer, headquartering there, located a number of mining prospects in the vicinity. So promising were some

of these that a company was formed with Poston as manager and, in 1857, ore was being taken out of the ground. The Heintzelman, a silver-copper property, was one of the largest worked. Following Spanish procedure, an adobe furnace was used to smelt the ore, and six hundred hours were required to make its first run, when 2,000 ounces of silver and 300 pounds of copper were recovered.

Other properties were opened, and so prosperous was the community that by the end of the year Tubac boasted of a population of 800 souls, one-sixth Americans, the rest Mexicans. Though the buildings were of adobe, here and there the brown of the walls was relieved by a few shade and fruit trees. For amusements the populace had poker and *quien con* of evenings, a *baile* on Saturday night, and cock fighting and horse racing on Sunday. Smuggling from old Mexico was considered a legitimate line of commerce by the part-breeds, and perhaps Americans as well, while the importation of *tequila* received the attention that so important a line of merchandizing deserved.

The mining company used its own currency, redeemable in silver bullion. As none of the Mexican laborers could read, the value of the *boleta* was indicated by a picture of an animal. A pig was worth a *real*—12½ cents, a calf represented "two bits"; a game cock, a half dollar; a race horse, a dollar, and a bull—a magnificent *toro* worthy of any matador's *espada*—was good in payment for a *mantilla,* a *reboso* or a *poncho,* to the extent of five good American *pesos,* down at the Company's *tienda.*

A perpetual handicap to the mining operations of both Spaniards and Americans had been the raiding Apaches. When the Americans first arrived, Apache chiefs, knowing

that during the Mexican war the peoples of the two nations had occupied hostile camps, proposed to the pioneers from the States that they join them in looting the Mexican towns in Sonora and Chihuahua, and incidentally slaughter the inhabitants; and were wholly at a loss to understand why their suggestions did not meet with a more enthusiastic reception.

Still, in spite of the fact that guards had to be continuously maintained at the mines, and prospectors everywhere were in danger daily of having their skins punctured by Chiricahua arrows, mines continued to be located and developed.

Considerable protection was given miners by the military posts which were now being located. In 1856, four companies of American dragoons were placed in the old *presidio* at Tucson. The year following Fort Buchanan was established on the Sonoita, twenty-five miles east of Tubac. Camp Breckenridge, near the junction of the San Pedro and Aravaipa Rivers, was garrisoned in 1859. Fort Yuma, on the California side of the Colorado, on the old road to San Diego and Los Angeles, had been established in 1851, and in 1858 Camp Mohave was built on the Arizona side of the river a few miles north of the present town of Needles.

From now on gold, silver and copper were worked in various places in Arizona. In 1858 rich findings of gold were discovered in the sands of the Gila, about twenty-four miles east of Yuma, where Gila City existed for a year or two on the strength of it. Some little copper ore was taken from the Ajo mines at about the same time.

Although sorely harassed by Walapai Indians also, in the same year, prospectors began working both gold and silver mines in what is now Mohave County. As we have seen,

when the Civil War broke out all of the soldiers were removed from present Arizona. The Apaches immediately took to the war path. In consequence mines, ranches and small settlements were everywhere attacked; in many cases the inhabitants were murdered.

At Tubac forty or so Americans withstood two hundred blood-thirsty Chiricahua Apaches, under the famous head-chief Cochise, all one day. That night, one of the defenders, on horseback, passed through the line of Indian sentries and rode safely to Tucson. Here a relief party was organized and Tubac was saved. With hostile savages on the war-path throughout the entire country, miners and ranchers fled to Tucson.

When the Civil War ended, soldiers were returned, additional military posts were established and conditions gradually improved. However, it was not until 1886, that the Apaches were finally subdued.

Still, in spite of the continual menace of the Indians, mining to some extent was continuously carried on. In 1862 placer gold was discovered in the muddy banks of the Colorado about 125 miles above Yuma. So rich did the deposit prove to be that the city of La Paz sprang into being, with a population, it is said, of five thousand miners, gamblers and adventurers of both sexes. The town was short lived. Six miles up the river a better boat landing was found, and within the year the saloon bars, the roulette wheels and faro layouts were loaded on freight wagons and moved to the new location.

So La Paz died and Ehrenburg reigned in its stead; but not for long, for the placers ran out and the population of Ehrenberg also was reduced to ground-squirrels, owls and

coyotes. By 1864, two million dollars worth of gold had been taken from the Colorado and Gila Rivers.

About Prescott, in Yavapai County, rich deposits of both gold and silver were found, and additional mines of the same precious metals were worked in Mohave County. The richest gold mine in the history of the state was discovered in 1863. This was the Vulture, located eleven miles west of Wickenburg, named after Henry Wickenburg, the lucky finder of the mine. Something over ten millions of dollars were taken from the Vulture before the vein was exhausted.

The greatest of the state's silver mines was discovered in 1872 by a soldier named Sullivan, but all that Sullivan ever got out of it was a job at day labor, when, broke and foot-sore, looking for a square meal and a place to sleep he wandered back to his old discovery, the famous Silver King, located in what is now Pinal County.

The first of the wonderfully rich silver mines that gave birth to the famous town of Tombstone was discovered by an eccentric pioneer named Ed Schieffelin. Though the country was infested with Apaches the phlegmatic searcher for metals held them in profound contempt. One day in the winter of 1877-78, as he was starting from a nearby camp to do a little prospecting a friend called to him, "Whar ye goin', Ed?"

"Oh, just over the hills to look for stones," absently returned the adventurer.

The friend chewed on his tobacco grimly. "Wal," he commented, "the likeliest stone for you to find will be your tombstone!"

So when Schieffelin found his lode, showing lumps of

native silver as big as his thumb, he remarked with a satisfied grin, "This 'ere tombstone is good enough for me."

The original location turned out to be of only moderate value. Later claims, however, were amazingly rich, and the Tombstone mines produced many millions. The feuds of rival gangs of outlaws, officers and gamblers of the town have been used as a basis for a thousand romantic tales, while the local paper, the Epitaph, is still nationally remembered for its unique name.

Altogether gold, silver and lead to a value well above $100,000,000 were taken from the rocks and sands of Arizona in the early days. At that, though, it was not until the copper mines of the state began to be developed that Arizona really became world-famous for her metals.

One of the locations early recognized as rich in its copper possibilities was the country about Mineral Creek, in the south-central part of the state, which, in 1846, attracted the attention of Lieut. William Emory, one of the officers with Gen. Stephen W. Kearney when the army of the latter made its march across the deserts from Santa Fe to California. The famous Ray Consolidated mine now operates where Emory noticed the copper indications at that distant date.

The rich copper mines of the Clifton-Morenci district were discovered by Henry Clifton, a prospector, in the days when the Apaches were too hostile to permit the property to be developed. Later, in 1870, they were relocated and worked.

A Government scout by the name of Jack Dunn was, in 1877, the discoverer of the Copper Queen, now one of the great copper properties of the world.

They were a wonderfully picturesque lot, these pioneer searchers for the earth's hidden treasures. From the '50's to the '70's of the last century prospectors usually traveled in groups large enough to inspire the respect of the Apaches. As with time the raids of that turbulent tribe became restricted to certain areas, propectors in safer zones usually took the risk of traveling alone save for the companionship of a burro or two. So indispensable were these animals to their owners that imagination balks at the thought of a mineral discovery in which they did not have their part. If the prospector possessed a pair of the beasts, one usually carried the tools—pick, shovel, bar, hammer, pan and horn-spoon,—while on the other would be packed the man's bed, a blanket or two, and for provender—flour, baking powder, pink beans, Arbuckle's coffee, salt pork or bacon, block matches, salt and tobacco. Both packs would be covered with strips of canvas, one of which, when camp was made, would be spread under the owner's bed and the other, if the weather was inclement, over it.

The burros, except in the most arid sections, lived pretty much off the country. Mesquite browse, dried mesquite beans that ground-squirrels had not yet harvested, dried cactus fruit, even not too thorny prickly pear joints, were all prime items of provender for these hardy "Arizona nightingales."

Different in temperament as the prospectors might be at the outset, the desert would in time mark them with common characteristics. It was inevitable that they should grow taciturn and given to dreams. They were all optimists or they never would have stuck to their calling. Next week—next month—when a round-up of the Apaches, or a good rain

to fill the water holes, would permit a trip into new territory —then—*then* they would make their Great Strike.

And the dreams that filled their brains concerning things they would do when wealth came! Squidgy Thompson, of Skull Valley, proclaimed to the world that when he found his mine he would have green gage plums every day of the year if they cost a dollar a can. Porphyry Gullet, who had prospected the desert between Quitovaquito and the Tinajas Altas, and knew what heat and thirst might be, vowed that when he had made his strike he'd have the adobe walls of his house six feet through, an olla (the Indian water jar) in every room, and live in the cellar with a China boy to fan him.

But as it is in most of our lives, with them the glories of anticipation far outshone those realized. Most of these men never did make their big strike. Many who did stake out properties which later became great mines received but little for their claims. A prospect, at best, is usually of questionable value, and most of them go through many hands before they are finally made to pay.

A few men, like Henry Wickenburg, when they found a free gold deposit, realized a little fortune, but not many had Henry's sober temperament to enable them to use their suddenly acquired wealth sanely. Most of them when real money was at last in their hands promptly exchanged it for the allurements of strong drinks, gambling and women. It was not strange that this should be so. These three enticements were considered to be the high triumvirate of joys. They were standardized vices—easily procurable and vibrating to man's elemental desires. Red liquor took the drab realities of life and painted them with the colors of the

rainbow; it turned their usual tongue-tied reticences into eloquent loquacity and converted their few dollars into millions. What if to-morrow brought a headache—let to-morrow take care of itself! To-day was the only time that was real.

Women—even the sort it was possible for them to meet—represented to them feminine lure, warm affection, tender sympathy. If at the bottoms of their hearts they more than suspected it to be counterfeit, for the moment it seemed like real coin—like the glorious pleasures to gain which Eden was forsaken.

And it must be remembered that their women did not always represent bestiality or even unalloyed selfishness. In the social stratum above the hard-faced *filles de joie,* with the death's head of tragedy scarcely covered by the rouge, were the entertainers in the big saloons, such as those that were found in Tucson and Phœnix, Albuquerque and Santa Fe. These vivacious young women, with their engaging airs of camaraderie, whose lips were quite as carmined and whose skirts were almost as short as those worn by the society débutantes of to-day, were not all depraved or even of questionable virtue. Naturally there were harpies among them, but others were instinctively kindly and generous, and the interest they took in the patrons of the saloon often arose from a feeling of genuine hospitality. They were hail fellows well met with every man—unless he were a Chinaman or colored—who entered the house. They sang to them and, if there was a dance hall in connection, and the men were not personally obnoxious, they danced with them. They were good company. It would be said in the vernac-

ular of the present that, conversationally, they "had a good line."

They received a commission on all drinks they induced a visitor to order, and, of course, they drank with them; but while the bottle passed out to them by the white-aproned dignitary behind the bar bore a hard-liquor label it usually contained nothing more potent than ginger ale. Also, they were right in believing that the more people a buyer could be induced to treat the better it would be for him; for inasmuch as he would never quit drinking while his money lasted, they knew the more quickly he was separated from his roll, the less firewater he would imbibe.

I remember, back in the eighties, seeing one of the "singers" of the old Palace saloon in Phœnix work for much of an afternoon sewing the rents in the coat of an old prospector whom she probably would never see again. She could much more easily have bought him a new coat, but she seemed to want to put something of herself into the service.

The gamblers were usually of tougher stuff—"hard boiled," as we have learned to say since the World War. In the better saloons the games were square, and the dealers reasoned that those who played opposite them had as good a chance to win as to lose. The sophistry in this argument lies in two things, there was a small recognized percentage in all games in favor of the house; in addition, the player—miner or cowboy—never really quit when he was winning. He might stop for an hour or a day, but he always came back. When he lost his "pile" he *had* to stop. In following the arguments of the feminine entertainers, the gamblers

were on safer ground. For a customer to become "ori-eyed" at the bar and make a fool of himself was decidedly harder on the constitution than for him to lose his money like a gentleman at the gaming tables.

And there were other emoluments to prospecting besides the joys of blowing in a stake. By working through the highlands in the summer and the lowlands in the winter the prospectors enjoyed a perfect climate the year around.

Another thing—they dined in the open and slept under the stars! There is wonder-work in that sentence. It brings to mind a state of living that to those whose desires are attuned to the out-of-doors, experience can never dull nor custom stale. In spite of discomforts, such as occasional storms and uncertain water supply, it is the life supreme. If you are a desert wanderer and have prayed to the desert gods and they have heard you, all your senses have been sharpened. You hear and smell and see things of which your inner consciousness never before took cognizance. Common fare becomes a feast for Lucullus in your mouth, sounds scarcely heard by the uninitiated turn to music, and quite ordinary objects take on a beauty that indoor folk never see.

Perhaps you are camped near water that friendly beasts and birds frequent. After your evening meal in which your furred and feathered visitors have participated, there comes a whispering of soft winds in the creosote bushes, a sleepy bar of melody from a thrasher in the mesquite, the soft tread of a rabbit, and, as it grows dark, if other sounds are very much subdued, the muffled squeaking of kangaroo mice may reach your ears. Then there are the delicate scents of the

desert—those exhaled by the herbs that come after the seasonal rains, the smell of moist earth, and the not to be forgotten delectable odor of frying bacon as, mingling with wood smoke, it rises like incense to the nostrils of the gustatory gods. Only, I beg of you do not choose *palo verde* wood for your fire or the odors will be anything but delectable.

And the delights of the eye—the waning glow of twilight, the coloring of the clouds, the deepening of the shadows in the canopy above you, the kindling of the stars and the slow intensifying of their brilliance, no cunningly devised effect of the greatest of theaters can ever hope to equal it!

Not that I mean to say that all prospectors appreciate these things. Those of the calling are like other men. Some never pray to the gods of the open air, and, having eyes, yet see little but ugliness; having ears, hear only discords. But many of them are true poets and artists, possessing the keenest appreciation of the scenes about them. Naturally, after weeks or months in the solitudes, they grow hungry for the gregarious pleasures of town, but it soon surfeits them, the walls of the rooms begin to press in upon them, the senseless clatter of city noises worry them, and the elbowing of people gets on their nerves.

Still this contact with their fellows must be kept up, a nice balance between companionship and solitude maintained. Too much being alone—in deserts, in jungles, even in crowded streets, is not good for one. Too much dwelling upon one hope, while not as dangerous as any sort of lingering upon a fear, has its elements of peril. Sometimes a persistent longing for one thing becomes like the insistent ringing of one note in the ear. The note may be musical

in itself, but after much repetition it must be changed or madness comes.

Two old chaps, searching for a lost mine in the Superstition Mountains, now cut through by the Apache Trail, were so obsessed by a hunger for the yellow metal that ever eluded them, that finally the curse of Midas came upon them and all rocks turned to gold in their eyes. Their mental balance never was wholly restored.

So, while wiser variations to the monotony of the lives of some of these old desert rats could doubtless have been found than their libations of hard liquor and their squanderings at faro bank, even these things may have held madness at bay, and certainly they were delinquencies easily condoned.

All of the mines of the Southwest have their stories of romance and adventure, but we cannot tell them here. Not only is there romance connected with the discovery of a mine, but with the working of it afterward. There is romance in the discoveries of assayers and chemists, dash and boldness in risking a fortune in backing the predictions of the geologist, adventure mingled with wisdom and courage in treating labor troubles.

New Mexico's most valuable mineral resource now seems to be her coal, recent Geological Survey estimates placing the total quantity yet in the ground at about 192,000,000,000 tons. Eighty-eight per cent of this tonnage lies in the San Juan Basin fields, situated chiefly in the counties of McKinley, San Juan, Rio Arriba, Valencia, Socorro and Catron. It is believed that the Raton Mesa field in Colfax County contains about 16,000,000,000 tons. Smaller deposits lie in Los Cerillos fields in Santa Fe County, and in the Carthage Field in Socorro County.

Some anthracite coal has been mined in Los Cerillos. The coal on the Raton Mesa is high-grade bituminous, producing excellent coke, while that of the San Juan Basin, though classed as sub-bituminous, makes a very satisfactory fuel if properly used.

Petroleum has been an active product of New Mexico beginning with 1924, with a steady output of oil from the Hogback and Rattlesnake pools in San Juan County, in the northwest corner of the state, and from the Artesia field in Eddy County, the southeastern county of the state. The value of the oil produced in 1925 was about two million dollars and should steadily increase.

Although not in the same class as Arizona as a copper producer, New Mexico's mines yielded 76,000,000 pounds of that metal in 1925. Zinc production for the state the same year was valued at over a million and a quarter dollars, while gold, silver and lead are also produced in limited quantities.

The principal metals now being mined in Arizona are copper, silver, gold, and lead. As is well known by all informed in mining, Arizona produces nearly half the copper mined in the United States. In one year (1925) the total amount produced in the entire country was approximately 1,693,000,000 pounds. Of this Arizona produced about 725,000,000 with a value of $102,298,700. This output in Arizona could easily have been much larger had the price of copper justified it. The largest producers were the United Verde, Copper Queen, Inspiration, Ray Consolidated, New Cornelia, Miami, Morenci, Calumet and Arizona, United Verde Extension, and Magma mines. Other mines that produced more than one million pounds each were the Arizona

Commercial, Iron Cap, El Tiro, Night Hawk, Midland, Shattock and Superior and Arizona. Many of these mines also produce both gold and silver in considerable amounts.

The gold output for the state for 1925 was $4,315,200, which was over one-half million dollars' worth less than the previous year. The largest producers for the year were the United Verde, Copper Queen, Calumet and Arizona, Tom Reed, New Cornelia, Magma, United Verde Extension, Old Dominion and Shattuck mines.

The output of silver in the state for the year was 7,322,600 ounces, worth $5,052,600, being 673,324 ounces higher than in 1924. It nearly all comes as a side product in the copper mines. The principal producers were the Copper Queen, Magma, Calumet and Arizona, United Verde Extension, Shattuck, Bunker Hill, New Cornelia, Old Dominion, and Iron Cap mines.

Lead production in Arizona for 1925 was 23,000,000 pounds, worth about two million dollars. The Copper Queen was the largest producer, with the Shattuck second.

A considerable amount of zinc was produced by the Calumet and Arizona.

Many other mineral deposits in the earth of the Southwest have been located that are believed by geologists and mining engineers to promise ultimate large revenues to the section. With some of these their economical value has not been thoroughly tested; with others, preliminary workings have proceeded far enough, and marketing problems sufficiently investigated, to make optimistic predictions concerning them entirely justifiable; in the case of still others the investigational stage is passed and the deposits are now being profitably worked.

Photograph by McCulloch Bros.

THE MIGHTY ROOSEVELT STORAGE DAM—Creates a lake 32 miles long and supplies water for 260,000 acres of reclaimed desert land.

These deposits in general include gypsum, limestone, salt, fire-clay, onyx, marble, asbestos, mica, various precious gems, cinnabar, manganese, tungsten, molybdenum, mineral paints, oil shale, vanadium, fluorspar and uranium.

For a number of years the mines of Arizona have paid from forty-two to over fifty per cent of the state taxes.

CHAPTER XXXVII

MAN-MADE OASES

PIONEERS in the Southwest, red men and white, have to their credit many remarkable achievements, but nothing they ever did was bigger than what they accomplished in reclaiming the desert.

There are places in the Southwest which in the last quarter of the nineteenth century were the most inhospitable of deserts, that are now lush stretches of verdure—places, in times now passed, where travelers, maddened by heat and thirst, followed mirages through thorn-bush and cactus to their death, that are to-day spots where motorists drive over concrete highways between groves of date, fig and orange trees; where the music of water, as in abundance it falls over irrigation head-gates, blends with the songs of orioles and mocking birds.

It is a stupendous thing to have accomplished. The making of the hanging gardens of Babylon, the setting up of the Colossus of Rhodes, even the building of the Pyramids were slight things in comparison.

To those early tourists of '49 and '50 it must have seemed that the little fields of the Pima Indians along the Gila represented all that ever could be done in the way of farming amid such arid surroundings. The Colorado was the one large river of the entire region, but its floods were so difficult to control that it was an impossible job for pioneer farmers to use its waters on any extensive scale.

The four streams with the greatest possibilities for irrigation were the Rio Grande, the Pecos, the Gila and the Salt. All of these rivers, even in those days when the floods from winter rains were in a measure held back by the sod and shrubbery of the mountain sides, were subject to great fluctuation in volume, at one season high, at another very

THE DESERT PRIMEVAL—Awaiting water to turn it into fruitful fields.

low. However, following the example set by the Pimas, the Maricopas and the Pueblans, in favorable spots by these and lesser streams, the early white settlers built their little canals, diverting water into them by means of rock and brush dams.

The earliest efforts at desert reclamation were made by the Spanish settlers on the Rio Grande in the seventeenth century. In southern Arizona, on Salt River, where arid conditions were much more extreme, the first white settlers to try

farming came south in 1867 from the mining districts along Hassayampa Creek.

These men dug a canal, taking water from the river some miles east of where Phœnix now stands. There was but little money in the country, and more than once, so it is recorded, laborers were paid in Mexican pink beans instead of in coin.

The enterprise was successful. The reddish-gray soil, that for centuries had produced only such growths as crucifixion thorn, creosote bushes and palo verde trees, brought forth not only luxuriant crops of grain and alfalfa, but wonderful watermelons and muskmelons, figs, grapes, apricots and peaches.

The successes of these first farmers brought other settlers, and eight additional irrigating canals heading in Salt River were constructed. All the ditches were in a measure held coöperatively. The farmers were the stockholders, and their stock carried water rights entitling holders to a certain amount of the canal's flow.

However, as the amount of land brought under irrigation increased, friction developed between the different canals. During seasons of high water—if the dams didn't wash out —there was water enough for everybody, but when water was low there would not be enough to go around, and the older canals appealed to the courts to prevent the newer ones, which might head higher up the river, from taking water they believed rightfully belonged to them.

It was generally conceded that the right to water should follow in the sequence of the original appropriation, but the question was raised whether the water thus appropriated belonged to the man or became irrevocably attached to the

land. Could a man use it on one piece one year and another piece the next, and if he sold a piece of land could he transfer his prior right to water to another farm?

These various matters were all threshed out in the courts. It was decided that an appropriation of water stayed with the land and not with the man, and the different units of land were entitled to water according to the date of their appropriation and only as their rights were kept alive by reasonably continuous use. It was also decided that a water right only entitled a farm to enough water for economical use, never any to waste, and a water commissioner was appointed by the court to see that each canal and farm received its rights.

But even wise court decisions and the presence of a water commissioner could not increase water so there would be enough to fill all the canals during times of drought, prevent dams from washing out during floods, nor avoid fifty per cent of the water being lost by seepage and evaporation in getting the water out of the river, through the canals and onto the land. Groups of men bought up shares in the different canals and consolidated administration under one management. Instead of permitting each canal to maintain a separate head of its own, the canals were connected with each other by means of cross-cut ditches, and plans were developed so that only one head should be maintained on each side of the river for the different canal groups. But there were still problems to solve. Reservoirs to conserve and regulate water, that could be created by building storage dams in mountain canyons, were greatly needed. Stronger diversion dams were equally necessary; more efficient head-

gates should be constructed and, if possible, the main canals should be lined with concrete.

With all irrigating systems there is naturally a difference in levels between head waters and final points of usage. These drops in grade make possible the development of electrical energy, which may be used to provide additional irrigation waters by pumping, if natural conditions permit, or produce revenue by sale of power.

While a start had been made toward the development of power, there were still large possibilities untouched. To develop all of the resources of a system of the magnitude of that along lower Salt River necessitated the expenditure of millions of dollars. The men who were carrying the financial burden of these canals in pioneer days were taxed to the utmost by developments costing a hundred thousand or so.

In the mountains eighty miles above Phœnix, where Tonto Creek joins Salt River, the construction of a storage dam would create a lake thirty-two miles or so long, and impound enough water in time of flood to insure an unfailing supply of water to all the cultivated lands under the canals the year through. It occurred to farmer leaders to ask the Government, through the Interior Department, to build this dam for them and let them pay for it afterwards, through a term of years, out of the earnings of their farms.

It is too long a story to detail here all that followed, but in the end Congress did even more than was asked of it. Operating under a reclamation act which was passed, not only did the newly created Reclamation Service build the storage dam which was named after President Roosevelt, but took over the existing system of canals and remodeled

them, built a diversion dam and head-gates and unified the entire irrigation system.

The Roosevelt Dam itself is 240 feet high, seven hundred feet across the top and two hundred and ten feet across the bottom. The reservoir lake created by it has a capacity of 1,637,000 acre feet, or water enough to cover 1,637,000 acres to the depth of one foot.

Primarily to increase still further the amount of water power, and incidentally to add to the water storage capacity, two other dams have since been constructed on Salt River. The first of these was built at Mormon Flat twenty-seven miles or so down the river from Roosevelt. Here a dam 147 feet high holds back 94,000 acre feet of water, forming a lake about twelve miles long. Its power plant generates 8,000 horse power of electrical energy.

In the summer of 1927 a third dam, lying between Roosevelt and Mormon Flat was added. This is 282 feet high, impounds 245,000 acre feet of water and forms a lake fourteen miles long. The power plant here, the largest in the system, produces 40,000 horse power.

There is still a fourth site for a storage dam on the river that will doubtless soon be utilized.

The cost of the initial project, which was advanced by the Government, was $10,540,000. All of this, except $380,000 which was expended for experimental work, is being paid off by the farmers who own the lands watered by the system, in a series of twenty annual payments, without interest. The last installment falls due in 1944. All later project improvements have been met by direct assessments, or by bond issues.

The electrical energy produced by the power plants is

Photograph from Putnam Studios

Irrigating Canal, Roosevelt Project, Arizona. Camelback Mountain in distance.

sold to municipalities and mining companies both for light and power. The revenues received therefrom steadily reduce the annual assessments, including maintenance, against the farmers.

In 1944 the farmers will own the system. At that time it is expected that the revenues to the Water-users Association from power and other items will reach $2,000,000 a year. The expense of the power system will be about $200,000 and for the irrigation system $500,000, leaving a surplus each year of about $1,300,000 to be used for improvements, besides giving the farmers irrigation water without any charge whatever!

With these potentialities in their hands the administrators of the Association, not satisfied merely with furnishing its members with water for their crops, desire also to add to their ranch conveniences and comforts. Among other things they are now studying plans to carry electric light and power to every farmhouse in the system.

The summers here in the lowlands are long and hot. It was recently suggested by the superintendent and general manager of the project that every three or four miles through the cultivated section, concrete swimming pools might be constructed. The $250,000 that this would cost, says the opulent Association, would be money well expended, considering the comfort and pleasure it would give ranch owners and laborers.

The development of this water irrigation project, which to-day delivers water to 240,000 acres of highly cultivated lands, has been enlarged upon not only by reason of the completeness with which its details have been worked out, but as an illustration of the wise foresight and keen judg-

Photograph by McCulloch Bros.

DIVIDING THE WATERS—One of the many head-gates on a New Mexico irrigating canal.

ment shown by these Southwestern farmers, aided by trained business men and engineers, and coupled with energy and the will to overcome. Of course the natural resources were here to begin with, but man had to establish the machinery to develop them and then, so to speak, make the wheels go round, before they could contribute so amazingly to his welfare and happiness.

In addition to the 240,000 acres now included in the Salt River Government project other irrigation systems in the same general vicinity, already in operation, cover about 100,000 acres more, while still others now under construction will further add to the acreage.

If the Salt River systems are further along in their development than some others in the Southwest, they are not the only ones doing mighty things. Upon the Elephant Butte project, on the Rio Grande, has been expended nearly $14,000,000. Its storage dam, which is situated near Hot Springs, is 306 feet high and 1,674 feet long. The storage lake created by it is at present the largest artificial body of water in the world. When it is full it measures one and three-fourths miles wide and more than forty-five miles long. It has a storage capacity of 2,600,000 acre feet and its irrigating canals cover 88,000 acres in New Mexico, 85,000 acres in Texas and 25,000 acres in Mexico.

The Yuma irrigation system, which irrigates lands both on the Arizona and California sides of the Colorado River, is another successful project. Now it waters something over 60,000 acres. Before long that figure will be raised to 120,000 or thereabout.

The Carlsbad reclamation system, another Government project, derives its waters from the Pecos River in New

Photograph by McCulloch Bros.

A garden in a man-made oasis in the desert country—where winter is banished and genial autumn touches fingers with laughing spring.

Mexico. Its reservoir, located seventeen miles north of Carlsbad, has a capacity of about 60,000 acre feet.

And still, as much as the pioneers have done in the Southwest in turning the arid deserts into fruitful fields, they say they are only well started on their work.

Irrigation systems now under way in southern central Arizona include the Coolidge on the Gila, Paradise Valley, northeast, and the Agua Fria, northwest of Phœnix. Plans for still others are being developed.

The Coolidge Dam, creating a great reservoir on the Gila River in eastern Arizona, is being built primarily to supply the Pima Indians with water for about 40,000 acres of land on their reservation; but at the same time, to make the undertaking an economic one, it will also furnish water for an equal acreage belonging to white farmers in the Gila Valley.

A concrete structure of the dome type, it is notable not only for the fact that it is of a design never before used in such a structure but, as well, that it exhibits the greatest strength against water pressure for its cost of any dam heretofore constructed in the world. Two hundred and fifty feet in height, it forms, at high water, an artificial lake twenty-five miles long and, at its greatest width, over two miles wide. The dam was designed by Maj. Charles R. Olberg, a government engineer of national reputation. Major Olberg is also superintending its construction.

New Mexico has the state legal machinery for the formation of districts for the purposes of development of the irrigation possibilities of small streams and rivers. Under its provisions the Middle Rio Grande project has come into being, which will water lands covering a district along the Rio Grande from 27 miles north to 97 miles south of

Albuquerque. It is hoped that more than 250,000 additional acres will thus be brought under cultivation.

In addition to these large systems there are small irrigation enterprises in various parts of Arizona, like those on the upper Verde, that will bring the amount of man-made oases in that state alone in the very near future to somewhere between 700,000 and 1,000,000 acres, and in New Mexico even more. And there still remains the Colorado River to be considered. Some two thousand miles in length, this mighty waterway receives drainage from, or in part borders, the states of Wyoming, Colorado, Utah, New Mexico, Arizona, Nevada and California.

In its course to the Gulf of California, in tributaries and main stream, its waters pass through deep canyons. Owing to the river's rapid fall—3,500 feet in 900 miles—by constructing high dams at strategic points, great artificial lakes, some of them many miles in length, could be created. These immense reservoirs would not only insure uniformity of flow on the lower river, and thus remove the present peril of disastrous floods, but would provide irrigation water for great areas and create an enormous amount of electrical energy.

Alive to the wealth a system of storage dams would create, each of the seven states naturally is desirous that its individual potential rights should be determined and carefully safeguarded. To reach an agreement among themselves, delegates from the different states, acting as the Colorado River Commission, under the chairmanship of Herbert Hoover, met at Santa Fe, New Mexico, in November, 1922. However, after considering the matter from many angles, it was decided that it would be impracticable at that time

to definitely determine the rights of each individual state and that, as a starting point, it would be better policy to simply arrange themselves into two groups and allocate the water between them. Wyoming, Utah, Colorado and New Mexico, they decided, were to be known as the Upper Basin States, and Nevada, Arizona and California those of the Lower Basin.

Taking engineers' estimates that the river carries 16,000,000 acre feet of water per annum, or water enough in a year to cover 16,000,000 acres one foot deep, to the northern group was allocated 7,500,000 acre feet, and to the southern group, 8,500,000. Speaking approximately, if this water should be used only for irrigation, the flow is considered enough to raise crops of average water requirements on over 4,000,000 acres of land, and to support a population of 40,000,000 people.

The legislatures of all the states but Arizona ratified the agreement, though Utah afterward rescinded its action, and California wanted modifications. For many reasons vital to its interests, Arizona insists that the amount of water to which itself, California and Nevada are entitled should be as definitely agreed upon as that between the two groups of states. Arizona also maintains that river beds and their waters belong to the state in which they lie and not to the Federal Government; it also insists that the state has the right to charge a royalty upon all water power developed within its borders. It emphasizes, too, the doctrine that all the waters of the Colorado River stored in the United States shall be reserved for the sole use of land lying within the borders of that nation, and that lands in Mexico may only acquire rights to the normal flow of the river. The reason-

ableness of the contentions advanced by Arizona are generally recognized by all of the Colorado River basin states save California, which objects to certain phases of them.

Any development undertaken on the river will have to be done with the consent and under the direction of the Federal Government as empowered by act of Congress. Bills outlining initial developments have already been introduced but it is vital, to prevent future litigation, that before any one bill becomes a law an agreement, ratified by all of the seven states, should be reached, and to this end authorized commissioners are at this writing (December, 1927) trying to arrive at conclusions that will be acceptable to all concerned.

At present about a million acres are being irrigated in the Northern Basin states, and less than 700,000 in the Southern Basin, of which 600,000 acres are in the Imperial Valley, lying on both sides of the international line, west of the lower courses of the river. About 400,000 acres of this land is in California, with 200,000 in old Mexico, where the canal irrigating the area heads. Practically all of this land lies not only below the bed of the river, but from one hundred to two hundred feet below sea level. In 1905 and 1906 water broke through the river levees and the flood, pouring through, threatened to permanently inundate the entire area and wipe out property now worth over $100,000,000. It did submerge 300,000 acres, two-thirds of which are still under water, forming what is known as the Salton Sea, 300 feet below sea level at its deepest point. It was only when the Southern Pacific railroad turned its vast resources to the task that the breach in the river bank was closed and the Valley saved.

It is primarily to render impossible a recurrence of such

a flood that Congress is determined to pass a bill that will insure river control, which means authorizing the building of one of the contemplated storage dams.

Government engineers have been studying the problems of the river for many years, and assert that, to fully develop its resources, in time thirteen great storage dams should be built. This will not only give a maximum amount of water for domestic supply to California cities now greatly in need of the same, and for irrigation and other purposes, but will develop to its greatest extent electrical energy which will have the enormous potential maximum of 6,000,000 horse power.

DOES DESERT FARMING PAY?

Down in the desert country, after their first irrigating canals were completed, the pioneer farmers were confronted with the question of what crops to plant. They wondered just what grains, vegetables and fruits could survive a summer where the mercury would touch from 100 to 115 degrees in the shade almost any day, and hot weather lasted from May until the middle of October. In the mountains, where dry farming was practiced and the summers were short, farmers had to decide what crops could be matured between the late frosts of spring and the early ones of fall.

However, in both localities they soon discovered a surprisingly diversified list of products that could be easily raised to supply their tables and feed their stock. Then their problem was to find a market for their surplus.

There were a few military posts and mines to which they could haul, in wagons, hay and grain, and even such things as poultry, eggs and fruit, but while prices were good, the

Photograph by McCulloch Bros.

ALL SHE CAN CARRY—Grapes find a wholly congenial home in the Southwest. In the mountains are raised such varieties as Concords; in the warmer sections one finds Muscats, Malagas, flaming Tokays and Thompson seedless.

amount of commodities these places could absorb was necessarily limited.

The railroads came, and the marketing area was greatly enlarged, but owing to outside competition, prices fell. It was then that the agriculturists of the Southwest began to learn what those in other places have discovered, that there is more to farming than planting seed, irrigating, or waiting for the rain to fall, and harvesting.

For one thing farm experts told them that while they were raising good crops and some of their products were excellent, with the natural advantages they enjoyed, not only could the list of things they were raising be greatly enlarged, but the yield increased and the quality improved. As a result agricultural colleges and experimental farms were started, expert farm advisers employed and scientific farming methods, which when first heard of were regarded with suspicion if not derision, began to be followed.

The deserts are not natural homes for the usual damaging insects that in humid sections have to be continually warred against by fruit and vegetable growers, but after orchards and gardens are started here these pests can easily come in and find a wholly congenial habitat, so plant pest quarantine laws were passed and such things as alfalfa weevil and citrus scales were kept out, grasshoppers and cutworms controlled, and plant diseases studied and successfully combatted.

As time went on farming conditions throughout the entire region continued to improve. Under the irrigating canals in the desert section, when the dams and head-gates did not wash out, yields were large and the products of the best. Wheat, barley and oats in the winter, and various maizes in the summer, produced wonderfully. When water was

especially abundant ranchers would get five and six and sometimes seven cuttings of alfalfa hay a year. Used as pasturage, milk cows throve upon it, while bees filled their hives with nectar from its blossoms. A land of milk and honey, truly!

Farmers were equally successful with fruits, their list including apricots, peaches, nectarines, plums, grapes, figs, grapefruit, oranges, lemons, strawberries, besides as fine watermelons and cantaloupes as ever grew.

Some of these crops brought a high commercial return, others did not. Some seasons one crop would command high prices; another year it would be a wholly different crop. As in other places the farmer, when he planted his seed, could only guess what the returns would be at harvest, many months ahead. A wonderful long-staple cotton was developed here—the Pima strain of Egyptian. During war times, and just afterward, prices rose to over one dollar a pound. Farmers went cotton crazy. Everybody planted it. Milk cows were sold for beef, and alfalfa fields were plowed up and planted to cotton. Fruit raising and stock growing were alike neglected. Then the bottom dropped out of the Pima cotton market, and hundreds of growers that had been doing extensive farming on credit promptly went broke.

Taught wisdom by experience, diversified farming is again being practiced, crop rotation is to a greater or less extent being followed, and the farmer is beginning to work out a plan of coöperative salesmanship for his crops.

Some years ago the growers of citrus fruits—oranges, grapefruit, and, to a small extent, lemons—formed an association and handled the selling end of the game coöperatively under expert management. They were wholly

successful. Now cotton, lettuce and cantaloupe growers and dairymen also combine in marketing their products, and have greatly improved their returns.

I do not mean by this that all the farmers in the Southwest are now making "big money," or that they are wholly unaffected by adverse conditions which have been working against the farmer throughout America for the past decade, but the abler men are pretty uniformly successful. It takes quite a man to be a successful farmer. He not only has to be an expert agriculturist, but, as well, keen about business. Not every farmer has the capacity to be both.

The Southwestern farmer has much in his favor. Even local realtors and secretaries of chambers of commerce and commercial clubs will admit this. They will tell you that by reason of natural advantages of climate and soil, with the present unfailing water supply and wise methods of coöperative marketing followed in many lines, not a few of the economic difficulties that have beset farming operations in other places have here been overcome. Going into details, they will explain that here crops are ripening every month in the year, and the farmer can always have something to turn into money; that certain crops grown here, such as dates, can be produced in but few other parts of America; that other products are of such a high quality that they always bring a premium on the market and can be sold profitably even with strong competition from other places. In this connection they will mention the fact that the desert grapefruit is sweet enough to be eaten without sugar, and that the same long-abiding, ardent sun that puts saccharine into the pomelo also puts additional sugar into grapes, cantaloupes, honeydew melons and oranges, so they, too, always sell above the market. They will even admit that

the quality of these fruits is so good that Arizona grapefruit sells at a premium even in California, and its cantaloupes are shipped to Florida. Winter vegetables such as peas, they explain, are profitably specialized in in sheltered nooks close to desert mountains.

The farmers of the uplands, too, believe they have natural advantages worth boasting about. The desert farmer grows most of his vegetables, except such things as sweet potatoes, in the winter. The mountain farmer naturally grows them in the summer. He believes their quality is unsurpassed in the world. He believes that his highland Irish potatoes are better than the lowlander can ever raise. He also raises apples, cherries and raspberries that the desert oases farmer cannot successfully produce at all.

To those of us who have visited favored spots in Florida, Texas and California, statements such as the foregoing have a familiar sound. Yet even the cynic, after investigation, learns to his surprise that on these man-made oases such glowing accounts are quite within the bounds of truth.

Still, it must be remembered that these days, here as elsewhere, a farmer must be a capitalist as well as a laborer. The time when a man with only a willing spirit, brain and brawn could go on a farm with nothing to pay down and expect to acquire ownership through crop returns, is past. Oasis farm land, with water, costs from $150 to $300 an acre, and if there are orchards or other improvements, their worth is added to the price. But even so, considering what one gets for his money, as the local chamber of commerce man can easily demonstrate, these figures are "dirt" cheap.

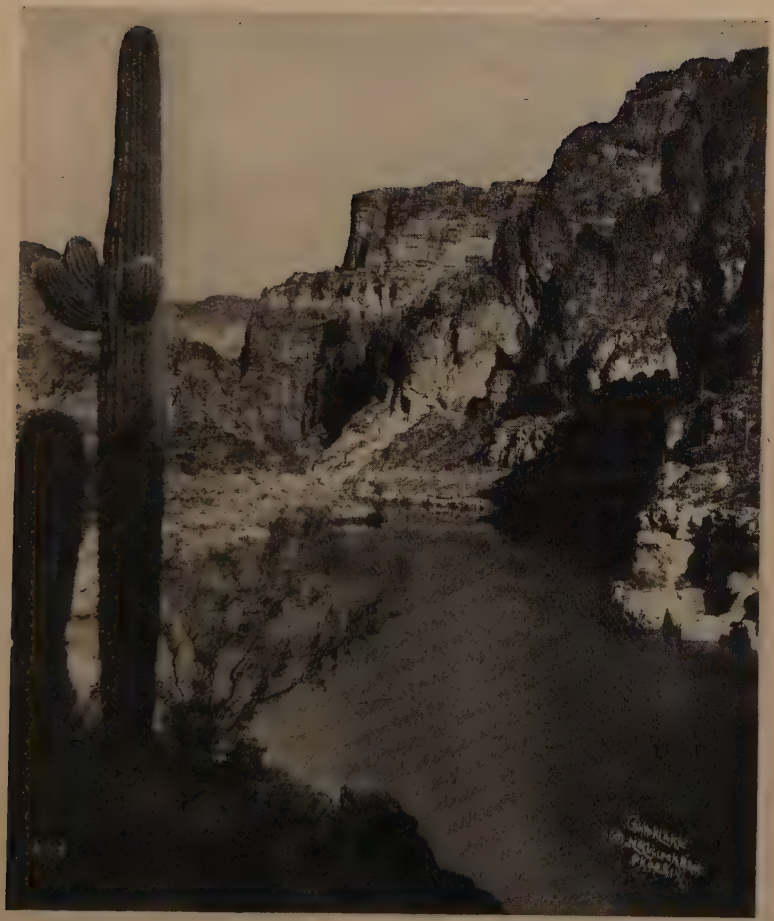
However, what is usually called the realtor's angle to the story of reclaiming the desert, is rather outside the scope of this chapter. What I am specially interested in are the

accomplishments of the pioneers who did all this wonder work, and the rewards they and their children are now receiving.

The farmer on these oases works hard; his crops come one after another too rapidly to let him have much idle time, but he lives well. The shacks of the old days are giving way to comfortable dwellings. As I have suggested, electricity is being brought to the farms, not only for lighting, but for power—to chop fodder for silos, to run washing and sewing machines, to operate electric fans and cool refrigerators. Soon it will be used for cooking. These farmers have radios, they drive good cars, their elementary and high schools are the wonder and admiration of all visitors, comparing favorably both in the appearance of the buildings, their equipment and the quality of their scholastic work, with metropolitan schools anywhere.

Before closing this chapter I wish again to refer especially to the beauty that man has created in making these artificial oases in the Southwest. There are the great fields of alfalfa a half mile or a mile in width; always beautiful, when a new cutting starts growing their vivid greenery makes them seem like great lawns. A few weeks later, grown knee-high on the opulent kine that feed upon it, the luxuriant forage is topped with a myriad of purple blossoms ravishing the eye as they sway gently in the caressing breeze.

In semitropical sections, equally enticing to the view are orchards of pomeloes and oranges, where the golden fruit stands out in striking contrast to the sheen of the verdant foliage, or perhaps it will be exotic groves of lofty date palms with shadowy aisles of coolness beneath their drooping fronds.



Photograph by McCulloch Bros.

CANYON LAKE IN SUPERSTITION MOUNTAINS—Created by man to furnish water for irrigation and to convert water power into electric energy, it is, by reason of its setting amid crags and cliffs, marvelous in its rare beauty. A unit in the Roosevelt Storage System, Arizona.

But even more than these, appealing to one's imagination as well as to his æsthetic senses, is the water itself in its continually varying form, that man uses to work these miracles. It is beautiful in the *acequia madre*—the mother canal—as it flows in a majestic stream fifty feet or more in width from the diversion dam on the river to the cultivated section, its surface sparkling under turquoise skies. It is beautiful in the tiny laterals, slipping with soft murmurs along roadsides under protecting ash and eucalyptus trees, or falling, splashing and foaming, over the rancher's head-gate. And especially beautiful is it as it rests, waiting and expectant at the beginning of its journeyings, in the reservoir lakes in foothills and mountains. Here, rising from its lapping edges, are towering cliffs, one hundred, five hundred, a thousand feet tall; the rocks dyed in soft colors modified by patches of dull green and brown herbage growing in many seams, bringing to mind the subdued hues of Gobelin tapestries and Persian carpets, while through rifts in the canyon walls one sees rising still higher against the blue, the points of distant peaks.

In the heart of the Superstition Mountains, along Salt River, strung like jewels upon a necklace, are Canyon, Apache and Roosevelt Lakes; the first two with a setting unsurpassed for sheer loveliness by any mountain lakes in America; especially stimulating to the imagination when one calls to mind that they were brought forth by man's fiat in a land where one might travel hundreds of miles across deserts where there is no water whatever.

There are a dozen or more of these magnificent artificial lakes in the Southwest, with the number steadily increasing.

CHAPTER XXXVIII

HEALTH AND HEAT

HE Southwest has long been celebrated as a health resort. For a half century its dry, tonic air and brilliant sunshine have been found to be peculiarly remedial in cases of asthma and of pulmonary and other forms of tuberculosis. Of late years, however, the region is gaining even greater fame as one of the most perfect spots in the world in which convalescents, or those who are not actually sick, but whose physical tone has been lowered, may recuperate. Dr. Franklin H. Martin, one of America's eminent surgeons and editors, who intimately knows the Southwest, was recently talking about its beneficial climate at a luncheon given in his honor.

"In the great cities of the East and North," he said, "men in strenuous business, and women in society and with family cares, become overwrought and overworked and finally find themselves breaking down because of lowered resistance. The wear and tear finally brings them to a break or near break. Cold of winter adds to the strain. A change to warmth and sunshine and pure, dry air is desirable. To such a climate the medical advisers of the north seek to send their worn-out patients for recuperation. The worn-out man or woman needs reënforcing. They are similar in every particular to a run-down battery.

"There are forty-eight states in the union. I believe that

science would support me in the assertion that Arizona has within its natural boundaries all the requirements for the foremost winter health resort of the nation." And what he said would apply equally to parts of New Mexico.

Included among the many who come to the Southwest to have their physical batteries renewed are some of the most distinguished people of America—and the world. Most of these after arriving engage in some sort of outdoor activity. Ex-Governor Frank O. Lowden, of Illinois, comes down with his family and rides horseback. E. F. Carry, president of the Pullman Company and W. L. Ross, vice-president of the Nickel Plate railroad, play golf, as does also George Barr McCutcheon, the novelist.

One of the Armours, of the Armour Packing Company, finds playing polo in the Southwest a good way to recharge one's physical storage battery; one of the McCormicks, of the International Harvester Company, gets his renewals from tennis; members of the Swift family by riding horseback over mountain trails. Mr. Cyrus H. K. Curtis and family spent much of one winter here, when Mr. Curtis recharged his batteries by taking vigorous walks. Zane Grey has a cabin in the Arizona mountains which he visits summers. Harold Bell Wright has a home on the desert near Tucson and raises range cattle. Randall Davies, the celebrated portrait painter, calls New York his home, but spends much of his summers on his ranch near Santa Fe, and enjoys trips to the lowlands in winter.

There are several famous schools in the Southwest where lagging physiques of growing boys are brought to par by daily horseback riding and living much in the open.

The use of the sun's rays, in the Southwest, as a treatment

for many diseases has already been commented upon. That both residents and visitors are more and more realizing the unquestioned benefits to be thus secured is seen in the fact that all over New Mexico and Arizona there are found in health resorts elaborately built solariums, while in private homes a topless tent or a screened-in portion of a flat roof is used as a sun-parlor where people take the "cure" simply by basking under the sun in a state of nature.

A wide range of ills of the flesh is helped by the treatment—many forms of rheumatism, tubercular affections not only of the skin and joints, but of the throat and lungs; also such troubles as low blood-pressure, anæmia and rickets are benefited; and most of all, it undoubtedly acts as a wonderful tonic to the average convalescent and to "run-down" folk whose "batteries" need "recharging."

Many people take their sun baths under the direction of a physician, others go ahead with them on their own responsibility. Speaking generally, it is well for the beginner to have the advice of some such informed person as a doctor or physical culture director, who can advise him concerning just how well the sun will meet his needs and how much of it he should take. Certainly if one goes it alone he should proceed with discretion, for sun bathing is not something that may be plunged into like one dives into a swimming pool.

The usual procedure suggested is for the beginner to start in by exposing only the feet and them for but a few minutes, gradually increasing both the area of skin bared and the length of time, until he becomes as inured to sunshine and the passing breeze as was the old-time Indian.

One ardent Southwestern devotee of the sun god, who was

very ill indeed with pulmonary tuberculosis, completely stopped the progress of his malady by taking sun baths, the length of which he steadily extended until finally, discarding his usual clothing altogether he went about all day long wearing nothing but very abbreviated running trunks, a straw hat and sandals.

Thus attired he did much of the work on his little five-acre "ranch," where it gave visitors something of a start when they would first behold him, apparently as unconscious of his lack of conventional raiment as a Greek god, driving up the cows or perched upon the seat of his mowing machine.

A region that so readily renews the health and vigor of its visitors may be logically considered as a healthful place to live the year around. However, when the native boasts of the health-giving qualities of the desert regions of the Southwest, the visiting auditor is apt to say: "I am willing to admit that your winter climate is the best in the world, but the summers—how do you feel when the sun gets hot enough to cook an egg?"

Many enthusiasts living in the desert country will tell you that they like the hot weather.

It is a well-known fact that there is but little illness here in summer. Also there is far less discomfort than a stranger would imagine. People adjust themselves to the climate. During the hot season men never think of wearing coats. Dwelling houses, if they are of brick or concrete, are usually kept closed during the day to keep out the heat, and left open at night to cool off. People absorb quantities of cooling drinks and sleep in screened porches, or under the stars.

As an illustration as to how little the heat is allowed to interfere with recreations let me quote from a letter written

by that enthusiastic "booster" for the Southwest, H. B. Watkins, General Manager of the Phœnix Chamber of Commerce, in reply to an inquiry concerning southern Arizona summer heat:

"In direct answer to the question of your representative, we would say that on the day the mercury reached 118 degrees, at 5 o'clock in the afternoon, the hottest part of the day, the lawyers of Phœnix played a seven-inning game of baseball with the Kiwanis club of Phœnix. It was noted that every tennis court in the city was occupied, and that evening every one of the numerous dance pavilions throughout the valley was packed. The reason is that Phœnix with a temperature of 118 degrees is cooler than Chicago at 95 degrees, owing to the lack of humidity here. We who live here every day of the year really enjoy our summers more than the winters, although our winters are considered the most wonderful in the entire United States.

"With every good wish and thanking you, we are,

"Cordially yours,"

However, to be quite frank about it, if one takes too many of these summers in succession without a break, or if one is in poor health, the hot weather becomes debilitating. This does not come from the fact that the heat of any one day is so extreme, but that the summers are so long. From June first until October there is a consistent high daily temperature. It is well to break these long stretches with intervals of cooler days. It is not difficult to arrange these breaks. If the mountains cannot come to Mahomet, so to speak, Mahomet, or any other desert dweller, can easily go to the mountains.

Tucson folks motor to the coolness of the Catalinas in two or three hours. Phœnix people can reach a number of mountain resorts in from three to five hours. Northward are the Bradshaws and the mountains around Prescott; to the northeast are the Sierra Anchas and the Tonto Basin country. The citizens of Carlsbad, Roswell and El Paso also have many mountain resorts easy of access.

Albuquerque has a comfortable summer climate of its own, but if its denizens desire an added degree of coolness during July or August, they have only to drive for a couple of hours or so to the mountains or to Santa Fe, and enjoy one of the finest summer climates known.

El Tovar, on the rim of the Grand Canyon, however, is the premier "climate cafeteria" of the world. If it is July, on the rim it is cool and bracing. You start down the trail on your dependable mule. One thousand feet down the air begins to lose some of its crispness; at Indian Gardens, half way down, it is pleasant summer weather. With each thousand feet further into the depths, the heat increases until you arrive at the river—and the tropics.

It has become quite the common thing now for the women and children to go to the mountains for part of the summer, while the business men of the family join them for the week-ends.

CHAPTER XXXIX

CATTLE, SHEEP AND DUDE RANCHES

HE story of the cowboys and sheep herders of the Southwest, their herds and flocks, has been told too often to need any extended repetition here. However, it may not be without interest to those who have read of the steady agricultural development of the Southwest, both by irrigation and dry farming, to learn that there are still large expanses of range country where sheep and cattle run, where round-ups have important seasonal place on the calendar, and where the herder marks spring and fall by the biennial migrations of his woolly charges between summer and winter feeding grounds.

Practically all the cattle ranges are in the foothills, the plateau country, or in the mountains, where the country is too rough, or available water supply too scant, to permit irrigation, but possessing sufficient rainfall to produce grass or browse. At headquarters the traveler will find the ranch houses rather better than they were a generation ago, and the cowboys quite as expert in their calling as were their predecessors.

Naturally there have been changes. There are more fences on the ranges than there used to be. Much grazing is now done on forest reserves, under the strict supervision of rangers who issue permits for a definite number of stock. The overfeeding which all but ruined the ranges in former times is now but little seen, and a definite recognition of the

rights of both cattle and sheep has done away with the wars between their owners and retainers that occupied such a prominent place in pioneer history.

To supplement the feed on the ranges, cattlemen now often own, or lease, highly cultivated ranches in the irrigated sections where cattle can be placed during times of extreme drought or to be fattened.

When seasonal rains permit, many of the sheepmen hold their flocks on the deserts, or in the lower foothills during the winter, and, with the coming of spring, move them slowly toward the mountains, advancing as the warmer weather starts the feed on higher and higher slopes.

To put the stock industry of the Southwest into figures, it may be said that in 1925, in New Mexico, there were 1,290,000 head of cattle, 2,360,000 sheep and 187,000 horses; in Arizona there were 1,027,000 cattle, 1,155,000 sheep and 130,000 horses.

If one fears that the modern cowboy is any softer or any less expert at his calling than were his predecessors, he need only attend a frontier celebration at Prescott or the exhibition "rodeos" at other places in the Southwest to have his mind set at rest. Never did finer horsemen ever sit a saddle or "bust a broncho," nor did they do better work in handling cattle.

The modern cowboy still wears the old picturesque costume. When at work his clothing and accoutrements are plain and serviceable, but when at play or on parade he may be quite as gorgeous as any movie cowboy—including Tom Mix. Indeed, Tom Mix, like Bill Hart, Will Rogers and many another wild west hero of the cinema learned his technic by punching real cows on real ranges.

Photograph from Bate Studio

Wild, rough, fast and furious are the sports of the mountains and plains as staged at Prescott, Arizona, during the Prescott Frontier Days Contests which date their origin from the year 1888, the oldest cowboy contests in America, perpetuating the spirit of the frontiersmen, those who blazed the trail into Arizona.

Sometimes one hears captious visitors from urban circles criticize even the work-a-day apparel of the cowboy, saying they can't conceive how a real he-man could ever adopt an ensemble so utterly theatrical and foolish. From gentlemen who believe that the epitome of evening sartorial adornment is a spike-tailed coat, to have one's throat encircled by a starched linen band that is about as comfortable as a hoop of steel, to shield a manly bosom with an equally stiff shirt front, and to cover his feet with shoes of varnished leather, the criticism is, to say the least, naïve. I never heard any one who could reasonably explain a dress suit, while a cowboy's costume is reasonableness itself.

The fact that most of the items contributing to his attire bear Spanish names indicates that the *vaqueros* of Sonora and Chihuahua had as great a share in its evolution as did the riders of Texas and New Mexico.

The cattle range from desert floor to mountain top. In following them the men are out in all kinds of weather—hot and cold, wet and dry. When on the trail their clothing has to be shelter as well as raiment. The cowboy's hat, so to speak, is the apex of his tent. A "four-gallon" Stetson, for choice, its high crown protects his head from cold in winter and tempers the heat in summer, while its broad brim either keeps rain and snow out of his neck or shields him from the sun.

Following the herd in summer was and is hot, grimy work; sweat and dust get into the eyes. There is no time to search a pocket for a handkerchief, so the cowboy's loosely tied neckscarf is at once handkerchief and towel. If the dust becomes too thick, the scarf is pulled over nose and mouth. In the same position it may be used as a protection against

Photograph from Bate Studio

Lawton Champie, riding Firebug Fits, and winning the world's championship broncho-busting contest at the Prescott Frontier Days Contests, Prescott, Arizona, held annually centering about the Fourth of July.

cold. For obvious reasons white would be a poor color for such a toilet accessory; and if it is to be colored, why not have it a good color like red.

The Mexican *vaquero* wears a *poncho* over his shoulders, which is simply a blanket with a slit in it through which the wearer thrusts his head. During rains it drains the water well down over the hips. His legs the *vaquero* protects with *chaparrejos.* American cowboys, for many years, have preferred an oiled slicker to a *poncho,* but they never have found anything better for leg protection than "chaps," which not only give comfort in inclement weather, but save trousers and the wearer's skin when riding through chaparral. For winter wear in colder climates the skins used for "chaps" are dressed with the hair, or fur, left on and worn on the outside.

The high heels on cowboy's boots, when he is riding, help keep his feet properly in the stirrups, and when dismounted and he has his rope over the neck of a broncho, the same high heels help amazingly in keeping him from being dragged.

The cowboy need not apologize for the colors of his holiday raiment. He simply satisfies his primitive desires a little more frankly than his urbanized fellow man. When one thinks of the costumes even the most sophisticated and sedate of masculinity wear when herding together and numbers give moral courage—as in a "Shriners' " parade for example—or in almost any lodge room—one wonders if the urbanite's assumed superiority is not simply a mask hiding keenest envy.

As for the cowboy's six-shooter, in pioneer times there were plenty of reasons, legitimate and illegitimate, why a man riding the range or trailing a herd should consider a

Photograph from Bate Studio

Something out of the ordinary in action—An Orojana race in the arena of the Prescott Frontier Days Contests, Prescott, Arizona.

gun a prime necessity. Each "outfit" not only represented whatever law there might be in the country but was, in a way, both legislature and court, and the cowboy was an officer of that court.

Should a group of cowboys surprise rustlers in the act of driving off some of their outfit's cows, a gun made an excellent deterrent. Or it might be that sheep were being driven into cattle territory where their presence would ruin the range for cows. This meant a defensive war, and warfare requires arms. Minor reasons for carrying a six-shooter include its use in reducing the wolf and coyote count, and in heading cattle in a stampede.

Never call a cowboy's rope a "lariat." Lariat is a corruption of *"la riata"*—the rope. Call it a *riata,* if you like, but the man who uses one usually refers to it as his "rope." Also remember that while to the average American the word *"sombrero"* brings to mind a hat with a high crown and a broad brim, in Spanish any hat is a *sombrero.* When a cowboy speaks of the ranch herd of horses he may call it a "cavvy" or a "cavviyard," a corruption of *caballado,* (pronounced cavayado). Sometimes he incorrectly refers to his horse herd as a *"ramuda,"* which is properly a relay of horses, and that word in turn is often confused with *"ramada"*—a porch for the ranch house.

Interesting heirs to cattle ranches are "dude ranches." A decade ago this title needed an explanation, but now every one knows they are simply ranches in the cattle country, or country that has once been used for cattle, where conveniences are provided for boarders. The name "dude" is not applied in a derogatory sense, nor is it supposed to designate

a fop. A dude is simply a person of either sex who is a stranger in the "Wild West."

Dude ranches naturally vary in the elaborateness of their arrangements, but at almost all of them the management prides itself on the fact that the guests can rough it there with a maximum of comfort. There is usually a central building containing assembly room, dining room and kitchen. Guest rooms are provided in little cabins conveniently scattered about. Bed and board are both apt to be good.

The guests are naturally people who like the out-of-doors, and obtain their pleasures from simple things. Sometimes there are tennis courts, croquet grounds and a place for dancing, but all other amusements are subordinated to horseback riding, and each guest is provided with a horse for his especial use. This does not mean that all guests are supposed to be expert riders when they come. Indeed, many of them never have been on a horse before arriving. But there are always plenty of gentle mounts; and, besides, efficient horsemen on hand to tell one which side of a horse it is that equine etiquette has elected as the proper one from which to gain the saddle; how to keep one's teeth from rattling when the horse trots; how to contravene its inclination when it prefers the wrong turn at crossroads, and how to urge it forward when it desires to stop and gaze at scenery.

Excursions on horseback may be for an hour or a day, or a party may go camping, with pack animals to carry bedding and provisions, for a week or more. If the environment is favorable, hunting and fishing may be included in a guest's activities.

The general supervision of the riding is in the hands of

the guides. On a cattle ranch the man who handled the *caballado* is called the horse wrangler; so at a dude ranch, the guide who rides with the guests is designated the dude wrangler. The best of these are men of unusual ability and character. They have to be or they do not last. Not only must they be dependable and resourceful, but they must be familiar with even the wildest parts of the Southwest, its scenic spots, its opportunities for hunting and fishing, its trails and water holes. Naturally, they must know horses; not only how to ride and feed them, but how to shoe them and care for them when sick. They must know all about bits and bridles and saddles both for the beasts that carry humans and those that bear packs. They must know how to throw a diamond hitch, which requires two men, or the squaw hitch that one man can handle.

On a camping trip the head guide is the executive officer, and his rule is as supreme as is a captain's aboard his ship. Naturally, his autocracy must be ever tempered by diplomacy; he must know men, and, so far as such a thing is possible for a member of his sex, he must know women. He must be cheerful before breakfast with dudes who are constitutionally grouchy until they have had their matutinal cup of coffee; he must be firm at night with the quartette who want to sing to the dulcet harmonies of a ukulele after ten. He must be able to make the ample lady forget her saddle aches, and tell the skinny man what to do for his rheumatism. He must even know how to get along with the camp cook, or, failing that, to get a meal himself. In other words he must have the firmness of a Washington, the diplomacy of a Talleyrand, and the philosophy and good humor of a Will Rogers.

In the Southwest there are dude ranches in the foothills of the lowlands which for climatic reasons specialize in winter visitors. Others, in the mountains, are naturally most popular in summer. A number, in the halfway country between these extremes, have very good riding weather the year around.

CHAPTER XL

KEEPING ALIVE THE ANCIENT TRADITIONS

THE inhabitants of the Southwest pride themselves upon their progressiveness. The streets of their principal cities and many of their country highways are paved; their business blocks are modern in construction and conveniences, and are artistic in appearance. The merchants are enterprising, the newspapers alive, realtors are "hustlers," the Rotary, Kiwanis and Lion clubs and the chambers of commerce very much "up-to-date." But back of all this commercial aggression and glory in material achievement the Southwest is possessed of much fine sentiment. If its denizens are pardonably proud of their steel-framed office buildings, their coöperative marketing associations and their interurban bus lines; if in terms of bank credits they are boastful of the future, they never forget the romance of the past.

It quickens their blood to remember that the Pueblo Bonito was a great city before the time of Charlemagne. Then, too, they have learned to appreciate the fine qualities of the native races of to-day, and they realize what unique heritages of the past are such villages as those of the Hopis, the Zuñis, the Acomans and Taosaños. They are equally glad to believe that, in a way, they are the spiritual heirs of the Spanish days of romance as they existed in Sante Fe and Tucson in the early part of the nineteenth century.

Even to a greater degree they pay tribute to the pioneers

Photograph from Bate Studio

Weird, fascinating and spectacular are the rites of the Smoki perpetuating the Indian ceremonies, held annually at Prescott, Arizona, on the second Friday in June.

of their own blood—the American hunters, trappers, prospectors, miners, cowboys, agriculturists—who at the risk of their lives herded their cattle, opened the mineral treasure chests of the hills and worked their little farms. So to-day reunions are held by the men and women of the heroic yesterdays where the old spirit is revivified in ancient reminiscences and tales. On other occasions the younger generations bring back the past by fiestas, ceremonials and pageants.

Prescott, Arizona, nestled among pine-clad hills, has two festivals when its altars flame in honor of the old traditions. At one of these the "Smoki" ceremony is enacted. It was originally conceived as a burlesque of the famous snake dance of the Hopis, or "Moquis," as they were formerly called. Put upon a program to fill out a summer holiday, when the young men who undertook the dance began to study the significance of what they were attempting, all thought of burlesque disappeared, and instead they made their performance a picturesque and poetic rendition of the original rite which had its origin in the cliff dwellers' days, perhaps one thousand years ago.

Now it has become an annual observance. Other native ceremonies have been added, and so well are they enacted that all who see them, townspeople and visitors alike, are not only fascinated with the bizarre and barbaric features of the rites, but are deeply impressed with their symbolism.

Prescott's second annual celebration is the Frontier fiesta, which includes the Fourth of July in its three days of strenuous activities. It honors the prowess of the cowboy and the equally picturesque cowgirl. There are bronco busting and various other exhibitions of wild-west horsemanship,

horse races in cowboy style, bulldogging of wild steers and roping. Those who take part are true citizens of the range, experts in all points of horse and cattle lore. The purses offered are large, but the honor of winning is coveted even more by the participants than are the prizes themselves.

Photograph from Bate Studio

Snake Priests of the famous Smoki clan, who yearly are perpetuating in a serious manner the rites of the Indians of the Southwest, at Prescott, Arizona.

Spectators come half way across the continent to witness the sports and, reproduced by motion picture cameras, its stirring events give thrills to audiences in all parts of the earth.

Cowboy shows under various names, *"rodeos," "paradas"*

and the like, are also held annually in Tucson, Florence, Phœnix, Wickenburg, Payson and other places in Arizona and New Mexico.

Gallup, New Mexico, is the gateway to one of the most interesting and picturesque Indian countries in America. To the north, northeast and northwest lies the reservation of the virile tribe of Navajos, which, as we have seen, is not only the largest of all Indian tribes, but its members are among the most energetic and enterprising natives in America. To the northwest, also, live the ancient and mystic Hopis, to the southwest are the vigorous sons of the old warlike Apaches, and almost directly south reside the sociable and prosperous Zuñis.

It is fitting therefore that the efforts of Gallup in perpetuating the traditions of the past should be almost exclusively connected with the Indians, and that their three-day fiesta, which is called "The Intertribal Indian Ceremonial," held late in August, should be devoted to showing to the world that comes to its doors not only the picturesque past of the Indians, but their promise for the future.

So first one may think of this fiesta as an Indian fair that is, in many respects, like our own county and state fairs. Here the Indian displays his native artifacts—his pottery, baskets and blankets, his weapons and jewelry and, as well, exhibits from his fields, orchards and ranges.

Besides the prize pumpkins and many-colored corn, just as at the white man's fair, there are horse racing and other amusements, including many Indian dances and ceremonials. Only these latter are more than pastimes, the different tribesmen being seriously desirous to show white men that, while many of the old dances were barbaric enough, all were full

Courtesy Santa Fe Railway Co.

THE BASKET DANCE—San Ildefonso Indians—Fiesta, Santa Fe, N. M.

of meaning, and some of them devotional manifestations of high order.

An interesting feature of the program both for the ethnologist and the casual visitor is the opportunity afforded for one to observe characteristic differences in the ceremonies of the different tribes. Those of the Pueblans—the Hopis and Zuñis, for example—will be marked by a poetic, perhaps a humorous quality; those of the Navajo may emphasize magic and wonder-work in healing the sick, while the Apache, if he lets himself go, may stage exciting reminders of the old dances of the chase and of war.

The management of the Gallup fair states that all revenues derived through membership in their association and admissions to their ceremonies and fair are expended in welfare work among the Indians through prizes and bonuses to stimulate interest in stock raising, farming and native arts and crafts.

The annual fiesta at Santa Fe usually fills five days early in September. Not only does it include an Indian fair, emphasizing especially what the red man is doing to revive the ancient tribal arts, but in pageant and play, with music and spectacle, it brings back the times of the *Conquistadores* and, as well, of Spanish colonial days, when Santa Fe was the end of the historic trail where bull-whacking merchants from the Mississippi brought to the capital of Spanish New Mexico their caravans of commerce. *Caballeros* in cloaks and feathered hats at this season return to their ancient haunts; Spanish soldiers in steel helmets and quilted or steel breastplates again tread the streets, and with them march friars in brown robes and *"Indios"* in aboriginal bravery.

One thing which makes the Santa Fe fiesta such an outstanding success is that the background is in perfect harmony with its pageants. Here still abides the romance of the old days. Here in plaza and patios are seen the descendants of the Spanish colonists and the dark-eyed, brown-skinned people of the pueblos. We call them Mexicans and Indians, and to ourselves arrogate the name "Americans," yet our Pilgrim Fathers were aliens and newcomers compared with their ancient forebears.

Here in Santa Fe one still sees burros used as means of transportation, as well as motor cars; churchly processions pass through the streets as in old Castile; soft-sounding Spanish words are incorporated into English speech; *tortillas* and *enchiladas* are served in eating places as well as waffles and doughnuts, and many a *doña* still wears a *rebozo* instead of a hat. This is the town that Oñate founded, that Otermin defended and De Vargas reconquered. Here still stands the ancient *palacio* of the Spanish governors, and the mission where white man and Indians worshiped over two and one-half centuries ago.

Even the present-day buildings of the town harmonize with the ancient atmosphere, blending as they do the style of the old community houses of the pueblo Indians with the Spanish colonial. These structures are unlike those found any place else in America. The best of them are altogether admirable. Their lines have been kept simple and dignified as were those of the ancient buildings which inspired them.

La Fonda, the modern hotel that marks the caravansary and corrals that stood at the end of the Santa Fe trail, is a happy mingling of an exterior suggestive of the old architecture, with twentieth century conveniences inside.

Other business edifices, including the Federal Building, are built in the "Santa Fe mode," with the State Art Museum, across the street from both Plaza and the old Palacio, the most successful expression of them all.

Many private buildings, too, show the spirit of the Santa Fe renaissance. Those that have kept away from the complex have attained an achievement that is very much worth while. In others, attempts at elaboration have been made where the results have not been happy. Fortunately these are the exceptions. Santa Fe is retaining the finest of its old traditions, and in doing so is developing an art that is not only distinctly American, but of which every American may well be proud.

A pageant that bids fair to become one of the leading annual ceremonials of the West is that whose initial celebration was held at Casa Grande, the ruin of the great house of the ancient canal builders on the Gila, in the fall of 1926. Prehistoric days were illustrated by incidents in the lives of the vanished aborigines who built the great pyramidal houses and irrigated the desert lands in the days of the Caesars. Dramatic events were portrayed leading up to their departure from their ancient dwellings for the lands of the cliff-dwellers.

The coming of the Spaniards was seen in the advent of that intrepid Franciscan, Fray Marcos, journeying with his negro servant, Estevan, as they searched for the mythical seven cities of Cibola. Following them came Coronado and his gallant but ruthless followers, who stormed a community-house pueblo of the natives. Plausibly introduced into the scene were spirited dances given by young Hopi tribesmen.

Next, the spectators had a glimpse, in comedy and more

serious drama, of old Tucson, with many songs and much dancing and laughter. Reminiscences of Mexican war days were recalled by the entrance of the famous Mormon battalion—marching infantry and a supply train of covered wagons.

Hundreds of people took part. The acting, though done for the most part by amateurs, was never awkward. Filled with the spirit of the scenes, they seemed really to live their parts. The costuming, while not strictly historical, harmonized with the story, and was always artistic. The impressiveness and artistry shown in stage effects and lighting deserve special mention. Bulked against the sky was a pueblo community dwelling, the earth terraces in front of it forming the stage. The program started about five o'clock in the evening. The earlier scenes were illumined by the rays of the setting sun. Slowly as the dramatic stories unfolded darkness gathered and stars appeared in the blue-black of the sky above the stage. Then from carefully selected points lights were thrown on the scenes in a way that lent an added enchantment to the ever-changing panorama, and left a memory with one long to be retained.

WOMAN PIONEERS

In all the stories told by the pioneers at their reunions concerning the settlement and up-building of the Southwest, the heroic part played by the women always occupies a prominent part. And the things they did, it is always remembered, were perhaps all the more heroic because they were so seldom spectacular.

On the long trek toward the Land of Great Expectations, upon the women of course largely devolved the care of the

children—for there were always children in the emigrant trains. Then there was the daily preparation of meals over a camp fire, and the monotonous washing of soiled garments when water was to be had. When her man fell sick the woman would take his place driving the team—goad in hand, walking by the side of the oxen.

During attacks by hostile Indians or white desperadoes, in addition to guarding the children, the women loaded the guns or revolvers, and when a man became disabled a woman would often take his place on the firing line.

After the journey's end was reached and the little isolated ranches were started, it was often necessary for the women to stand guard while the men plowed, sowed or reaped. Not infrequently when the men were away the women had to barricade their homes against raiding Apaches. Sometimes they would hold the savages at bay until relief came; oftener it was a losing fight against impossible odds, and at the end the mothers would see their children killed and suffer death and worse themselves.

They had no idle time on their hands, these women. In back-country communities they spun wool into yarn and knit the family stockings. They made clothing for their men as well as for their children and themselves. They repaired shoes, learned to dress hides and, especially in trapping and hunting days in New Mexico, made buckskin shirts and moccasins.

As may be imagined these pioneer women in their cabins of hewn logs in the mountains, or of sun-baked bricks in the desert country, did their cooking under most primitive conditions. Perhaps they would prepare their meals at a fireplace or over an improvised stove fashioned like the Mexican

hornilla, built on an earthen floor with stone or clay sides and a grill or sheet of metal for a top.

I recently heard an old lady, who came as a bride to Arizona in the sixties, tell of the pride that filled her when she became the possessor of the first real cookstove in her community. It was made of light sheet iron, but it had an oven of sorts, and she said it baked beautiful biscuits and dried-apple pies.

In addition to household duties the women would often assist their men folk about the corral or in the fields, milking cows, caring for stock, hoeing weeds, planting and harvesting.

Before schools were established mothers would instruct their children in the rudiments of reading, 'riting and 'rithmetic, or perhaps one mother in a community, having had more educational advantages than those about her, would add the neighbors' children to her own brood.

Pioneering is still going on in outlying country in the Southwest, and the women continue to play a prominent part in it. Mrs. John Wetherill, with her husband and associates, has for many years conducted a trading post for the Navajo Indians at Kayenta, Arizona. She probably speaks the Navajo language better and knows more of the Navajo temperament than any other white person in America. In her long dealings with these Bedouins of the Painted Deserts she has shown such wisdom and sympathetic fairness that the tribesmen now look upon her as a great chief—a woman judge. They come to her for advice; they ask her to adjudicate differences among themselves and to adjust quarrels. And they abide by her decisions.

One day a group that included both Navajos and Paiutes came to Kayenta to get her judgment upon a question of

damages. A Navajo stated that a Paiute, who was present, had killed a fine, fat cow belonging to him over in Monument Valley, and he thought the man should be compelled to give him a good horse in payment.

In his defense the accused Paiute stated that he was riding with some companions when they saw the cow lying down. They noticed that she was so thin and had so little strength that she could not get on her feet to walk to food and water. Out of sympathy they had tried to "tail her up" but she fell and died. Naturally, he said, he should not be asked to pay anything for the cow, but should receive the thanks of the Navajo for trying to save his animal. A second Paiute testified that his tribesman's story was correct.

Mrs. Wetherill sat a while in silence thinking the matter over and then gave her decision. "We shall have some disinterested Indians from Black Mountain go to Monument Valley with you and bring in the bones. If the bones are yellow from the good condition of the marrow we shall know that the cow was a fat one; if the bones are white we shall know that the cow was down and dying."

At this wise statement there were grunts of approbation from the Navajos; as for the Paiute, he simply shrugged his shoulders and remarked grandly: "I don't think we had better bother the great white woman chief any more with this small matter. I will give the Navajo a horse."

In spite of the best endeavors of officials on the reservation to prevent it, not infrequently Navajos of substance have more than one wife. Several years ago there was a prominent member of the tribe who was lord to three spouses, one a woman of thirty-five or so who had a touchy temper and, according to Indian standards, was decidedly

homely; of the others, nieces of the older woman, one was nineteen, a good worker and provident, while the younger, only thirteen, was rather a nice little thing and decidedly pretty.

The members of the household did not get on well together; indeed there was so much dissension that the continued rows bid fair to become a local scandal. Relatives and friends talked the matter over and decided to bring the four principals before Mrs. Wetherill and ask her to act as a court of domestic relations. This was done, with fully fifty Navajos, women as well as men, escorting the husband and his wives to Kayenta.

The Indians sat in a group out of doors in the shade of the Wetherill dwelling overlooking the wide upland plain, the men squatting on their heels, the women inclined to sit flat on the ground. Mrs. Wetherill's chair was placed in their midst.

The husband started proceedings by telling his version of the domestic infelicities; the two older women then related their sides of the matter. The youngest one, for the most part, sat quietly, keeping her eyes away from her lord as though afraid of him.

After the principals had testified, there was a free discussion of the case by all the Indians, with Mrs. Wetherill occasionally asking questions. Finally she suggested that as a starting point, inasmuch as the husband had shown he could not get along successfully with three wives, he had better discard two and start anew with one.

The Indians agreed to that, and the husband said quickly, "Then I take her," and pointed to the pretty one.

This started hours more of talk, and it was evening before

they were ready for Mrs. Wetherill to render the final verdict. "You can't have the youngest one," she told the husband firmly. "She isn't old enough for you. Later she can get a husband more nearly her own age."

"You ought to make him take the oldest one," put in a wrinkled ancient crone with a hard look at the husband.

"I won't have the old one—all by herself," declared the husband emphatically. "She's an awful woman. I'll keep all three first."

"You will take the middle one," decreed the modern Portia. "She is old enough to hold her own with you, yet young enough and capable enough to make you a good wife. That is my judgment. Court is adjourned."

All present agreed that the decision was just, husband and wives accepting it as final.

It may be suspected that Mrs. Wetherill had reason to surmise that Number One could find consolation in a separation as well as Number Three. This was more than suggested a little later, for after the Indians had gone over to the trading post the old crone who had shown sympathy for Number One in the afternoon came up to her and said, "So they have taken your husband away from you."

With a grim smile the woman nodded her head.

The old crone put her hand over the deposed one's heart. "'Huh," she grunted. "It don't beat fast at all!"

"Why should it?" returned the ex-wife. "I got plenty of sheep. I catch another husband easy enough, a young one, too—if I want him."

CHAPTER XLI

HOW TO SEE THE SOUTHWEST

As it is a land of excellent roads a very good way to see the Southwest is to go in one's own motor, especially if there is some one along who knows the country. Still, even if the entire party are visitors for the first time in Enchanted Land, in every community garage men, the automobile club representative or chamber of commerce secretary, are always glad to tell one what is worth seeing and how to see it.

Equally thoroughly, however, the country may be seen by the visitor who comes by train. At almost every station, on either of the two trunk lines that traverse the section, automobiles may be rented, with drivers who know the country.

Both the Santa Fe and the Southern Pacific railroads provide motor car detours under their own management for part of their passengers' journey through the Southwest. The "Indian Detour" of the Santa Fe carries passengers in luxurious motor buses between Las Vegas and Albuquerque, including in the itinerary the Valley Ranch, the Indian pueblos of Tesuque, Santa Clara, San Juan, and the ancient ruin of Puyé—a cliff pueblo that was inhabited at the time of Julius Caesar. Side trips may be taken between Raton and Santa Fe, passing the pueblo of Taos, and, going west from Albuquerque, visiting the pueblos of Isleta, Laguna and Acoma. Each of the Santa Fe motor cars carries a lady courier who knows the country intimately—its history and

legends, and whose interesting personality adds much to the pleasure of the trip.

The Grand Canyon may be visited by rail over the Santa Fe, a branch running from the main line at Williams north to El Tovar on the South Rim. From El Tovar excursions under Santa Fe management may be taken by motor buses to various points of interest along the South Rim, or a camping trip to the North Rim, with saddle horses and pack animals, may be engaged in by descending a trail from El Tovar to a steel suspension bridge not far from Phantom Ranch and going up a trail on the north side.

From June first to October first passengers on Union Pacific trains going through Utah are given an opportunity to visit the North Rim of the Grand Canyon and other scenic points by the means of modern, comfortably equipped motor buses operated under Union Pacific management. These buses leave the railroad at Cedar City, Utah, and follow a route that includes Cedar Breaks, Bryce Canyon and Zion National Park. The Rim is reached, after an inspiring drive through the Kaibab forest, at Bright Angel Point, one of the most picturesque spots along the entire canyon. Here, as well as at Zion Park, Bryce Canyon and other stopping points, hotels or lodges are provided where guest rooms are most comfortable and food and service of high quality. The trip covers several days.

In the Southern Pacific detours, high-class automobiles run between Phœnix and Globe, taking passengers over the scenic Apache Trail, which skirts the beautiful Roosevelt, Apache and Canyon Lakes, lying like jewels in their settings beneath towering cliffs.

There is an interesting cliff dwelling ruin near the Trail

Photograph by McCulloch Bros.

A PAVED HIGHWAY IN THE IRRIGATED DISTRICT UNDER THE ROOSEVELT RESERVOIR—The Southwest is a land of good roads. Cultivated sections, deserts and mountains alike are traversed by well-graded, well-surfaced roads.

not far from Roosevelt. Other similar ruins can be seen by side trips which are provided for by the Southern Pacific management. A stop is made at Apache lodge, a Southern Pacific hotel on the shore of Lake Roosevelt.

At the well known resort, the San Marcos, at Chandler, Arizona, one of the best known guides in the Southwest supplements a motor service with pack and saddle animals, conducting parties into the seldom-penetrated back country as well as the sections reached over automobile highways. At El Tovar, on the rim of the Grand Canyon, guides, saddle horses and motor service are also at the command of the visitor. A unique motor trip de luxe may be arranged for at Phœnix with the McArthur Brothers who operate a "wonder bus" that well deserves its name. This is a "private car" automobile, as complete in its way as a Pullman, with club room, berths for sleeping, a kitchenette and dining alcove. A supply car accompanies it.

The number of automobile stage lines is steadily increasing in the Southwest. Some of these lines do interstate business, following the main highways going east and west, with side lines to local points.

While the region has long had a few good roads, it is only since about 1916 that New Mexico and Arizona have been constructing, in a large way, comprehensive highway systems upon modern engineering lines. In this work both states have been able to avail themselves of liberal Federal aid. Some hundreds of miles of these roads have concrete or other hard surfaces, while all the rest of the more important highways are surfaced with such material as crushed rock or decomposed granite. These roads are broad, with easy grades through the mountains, and are drained with culverts.

Altogether the mileage of highways and lesser roads in the two states probably reaches a total of 16,000 or so, and by means of them not only the towns and more important agricultural and mining sections may be reached, but also many remote sections of mountains, foothills, and desert.

Particularly noted for their scenic beauty are such roads as Hassayampa Trail, between Phœnix and Prescott, the Coronado Trail between Clifton and Springerville, the Apache Trail between Mesa and Globe, the road up San Francisco Mountains, the Old Trails Highway at about the border of Arizona and New Mexico, and east of Las Vegas, the roads between Gallup and Zuñi, between Santa Fe and Taos, and eastward from Taos through Questa and Elizabethtown. There is a very picturesque stretch on the Roswell-Alamogordo road over the Sacramento Mountains.

There are two principal automobile highway systems passing through Arizona going east and west. One of these crosses the high plateau in the north central portion of the state, going eastward from Needles, California, on the Colorado River, through Ash Fork, Williams, Flagstaff and Holbrook, where it branches, ultimately giving travelers a choice of three routes through central and northern New Mexico. This route gives special delight to summer travelers, as, on account of its high levels, the weather at that season is delightful.

The second of these east and west routes passes through the southern deserts and is especially favorable for travel in the fall, winter and spring. It enters Arizona from the west at Yuma and goes eastward through Phœnix, giving a choice of mountain travel farther east over the famous Apache Trail, the Superior highway, or through a picturesque forest of

cacti, via Tucson. Continuations of these roads in New Mexico not only make connection with various southern towns of the state but extend eastward as excellent trans-continental routes.

North and south automobile arteries in Arizona link Phœnix and Tucson with Prescott, the Grand Canyon, the Hopi Indian villages and the suspension bridge at Lee's Crossing on the Colorado. In New Mexico there are north and south highways following, in a general way, the Rio Grande and the Pecos Rivers, with an additional highway going north from El Paso through Alamogordo.

The welcome given to Fray Marcos, the first European to penetrate the Southwest, by the natives whom he called the "Painted Ones," established a reputation of hospitality for that section that has been sustained by later white denizens of the country for four centuries.

The early Spanish colonist greeted his visitor with the phrase, *"Esta V en su casa"* (you are in your house), which was his nice way of saying that the best the place afforded was at the guest's disposal. In American pioneer days, at hunter's camp fire, at miner's cabin or cattle-ranch dwelling, the visitor—whether an acquaintance or a stranger—would be just as welcome. The manner of the Anglo-Saxon host would not be as effusive as that of the Spaniard, but his hospitality would be just as whole-souled; the visitor would be welcome to partake of the provender to the last Dutch-oven biscuit or the final pink bean, and, if he failed to bring blankets, he could share those of his host.

To keep alive this sort of hospitality, appreciative guests are required as well as generous hosts, and, while for obvious reasons limitations have had to be placed upon liberality

since the arrival of railroads and hobos, the old spirit that prompted the open-heartedness of the pioneers still lives in the land of the "great open spaces." Even mine host at the wayside hashery, or the varnished-hair clerk at the fashionable resort hotel, gives the arriving guest a welcoming smile that is inspired by genuine good will and friendliness quite as much as by any thought of pecuniary gain.

Whether in town in the cultivated sections, or along the highways in the wilder regions of the Southwest, the visitor has no trouble in finding fairly comfortable places to eat and to sleep. Even in villages containing but a few hundred inhabitants there is apt to be a commercial hotel, and often an auto-camp for the benefit of the traveler, while at convenient strategic points along all important automobile highways, flanking a filling station or garage, will be a lunch counter and a place where lodgings may be secured as well.

For those who desire the superlative in surroundings, in rooms, table, service and entertainment, there are several resort hotels in the Southwest of the very highest type.

The most widely known of these is probably the San Marcos, in south central Arizona, in a luxuriant oasis of verdure made possible by the abundant waters of the famous Roosevelt Reservoir. Here there is a broad, two-story building, in Italian-Spanish architecture, where arched balconies look down upon beautiful patios and gardens. The gray walls are covered with climbing roses and other vines, as is the pergola that spans the sidewalk in front. Flanking the main building is a beautiful park in which are situated twenty-five charming bungalows designed by one of America's leading architects.

Provided for the entertainment of the guests there is an eighteen-hole, grass-fairway golf links, also a Bermuda grass-sodded polo field, tennis courts and children's playground. At the desert's edge, a few miles away in the foothills of the mountains, is a lodge where saddle-horses are kept. Nearby trails have been made leading up the sides of hills that form a natural amphitheater overlooking a race track that is used for Indian sports, horse races and like diversions.

Chandler, the town where the San Marcos is located, is on the main line of the Southern Pacific railroad, and is surrounded by highly cultivated farms. Guests coming by the Santa Fe route motor to the hotel over paved roads from Phœnix, twenty-three miles to the northwest.

The Ingleside Inn, about seven miles northeast of Phœnix, is situated in the midst of a beautiful orange grove, the oldest in the Southwest, and has an inspiring view of Camelback Mountain, a few miles to the north. Here also one finds bungalows supplementing the main building with guest rooms.

Castle Hot Springs Hotel, in the foothills of the Bradshaw Mountains, forty miles north of Phœnix, is reached by automobile stage from a junction on the Santa Fe railroad, twenty-four miles away. It is located in a picturesque canyon in which there is much foliage—palm and orange trees, lawns and flowers irrigated by water from the springs. The water as it comes from the rocks has a natural heat of from 115 to 122 degrees.

Horseback riding is a major activity at both Ingleside and "Castle Hot." Also at both are found tennis courts and golf links. The San Marcos, Ingleside and Castle Hot Springs are all closed during the summer.

Photograph by Albertype Co.

WHERE THE DESERT BLOSSOMS LIKE THE ROSE—Not many years ago the site of this beautiful garden of the San Marcos, at Chandler, Arizona, was a cactus-covered wilderness. The miracle was accomplished by irrigation.

El Conquistador, at Tucson, looks across the cactus-covered desert to the rocky slopes of the Santa Catalinas. It is built on graceful Spanish colonial lines, and designed to bring much of the sunshine and fresh air of out-of-doors within its walls. There are forty-six guest rooms in the main building.

Just north of Santa Fe at the southern end of the Rockies, where the greenery of the mountains comes down to greet the brown upland plateau of northern New Mexico, is the Bishop's Lodge. This famous resort is built upon the site of the pioneer bishop Lamy's *villa pintoresca,* and consists of three guest buildings in brick and stucco, following the unique Santa Fe style of architecture. Within one finds the modern conveniences and services typical of the best resort hotels. The guests do much horseback riding and motoring. The nine-hole golf course is a sporty one, and the tennis courts are good.

The Lodge is open the year around. The winters are cold, but with plenty of sunshine, while the 7,300 feet of altitude makes the summer climate cool and bracing—quite ideal.

Everyone throughout the world who has heard of the Grand Canyon of the Colorado River, has heard of El Tovar, the picturesque hotel on its rim, at the terminus of the branch line of the railroad from Williams.

It belongs to the Santa Fe railroad, and is operated under "Fred Harvey" management. To sum up its many excellences in a sentence let us say at the outset that it is exactly what one would want such a hotel to be. Its architecture suggests a Norway villa or a Swiss chalet; the lobby, in its rustic beauty, is vastly comfortable as well as picturesque.

Summer and winter an endless succession of interesting people come and go—royalty and nobility from Europe, captains of industry, artists and writers from America—and everyday folk from everywhere.

The famous Harvey Houses are scattered along the Santa Fe through Arizona and New Mexico, in tiny hamlets, where the hotel seems half the town, and in larger places. Everywhere the service is prompt and given with a smile, everywhere the cuisine is the sort that makes "Fred Harvey" a name to conjure with. Especially worthy of mention are the Alvarado, at Albuquerque, the Navajo, at Gallup, and the Escalante, at Ash Fork.

La Fonda, at Santa Fe, the largest of all the Harvey Houses, is the most important stopping place on the Santa Fe Railroad's Indian Detour, while the Apache Lodge, at Roosevelt Lake, is a comfortable and interesting hotel run by the Southern Pacific Railroad for the benefit of passengers taking the Apache Trail automobile trip. At Taos, an interesting hostel, with an artistic atmosphere, is the Don Fernando. (It is almost impossible to avoid being artistic at Taos.)

In all the principal cities of the Southwest there are hotels which while most of their business is transient, are abiding places for visitors who stay for months at a time. Prominent among these are the Hussman at El Paso, the Franciscan, at Albuquerque; the Santa Rita, at Tucson; the Hassayampa, at Prescott, and the San Carlos, the Adams, the Jefferson and the Luhrs, at Phœnix.

Before we finally take leave of our friends of the Southwest may I again recall my belief that in spite of their intense practicality and their proneness to apply the acid to questionable schemes and personalities, more than average

folk are they given to ideals and optimism. As to their big way of doing things, I wonder if their inner vision does not become magnified by the unconfined sweep of their deserts, and inspired by their heaven-piercing mountains. And when once this vision comes, what better spur to accomplishment could be supplied than the tonic of their blue skies and sparkling air.

For a long time the East generally believed that the name, "Arizona," was derived from the words "arid zone," and was adopted by these Southwesterners as deciding, that except in what we now call a Volsteadian sense, their territory was so hopelessly desiccated that they might as well accept the aridity as a permanent condition.

Nothing could be further from the fact. The name of the state came from Arizonac, the designation of a Papago settlement near Nogales. In the language of that tribe the word signifies a group of little, but ever-flowing springs. To Arizonans the name is an inspiration not only to keep the fountains that supply their irrigating canals always flowing, but to see to it that the water shall ever increase.

Old Mexico named itself after the Aztec war god, Mexitli. In prefixing the "New," an Albuquerque man explained to me that his state was simply putting the war god on a new job. "Our battles are all against that doughty Amazon, Nature, in her hostile moods," he said, "and already we've got her where she's paying us tribute every day in the year."

The state flower of New Mexico is the yucca. "Bells that ring peace and prosperity," says the Kiwanis secretary, "rising above the oldtime, warlike Spanish bayonet."

Arizona's state flower is the cream-white floral triumph of the Sahuaro cactus, which any Rotarian will tell you is typical

of the fact that the state is making the desert blossom like the rose.

New Mexico's nickname, the "Sunshine State," would be equally appropriate for Arizona, but on account of the latter commonwealth's preëminence as a producer of the red metal, it is specially known as the "Copper State."

There is an ancient story about an invalid who, in the early days, came to the Southwest hoping to regain his health. The doctor told him to keep in the open and drink plenty of milk, so, to get close to what he thought would be a source of supplies, he arranged to live at a cow camp, which was the last place in the world in those days, to obtain dairy products. Range cow-men, in pioneer times, looked upon the lacteal fluid *au naturel* solely as sustenance for calves, diluting their matutinal coffee with condensed milk of the can.

It was a dry season—dryer even than usual. One Sunday the tenderfoot sat on a rocky eminence overlooking an arid stream bed where some gaunt bovines were browsing disconsolately upon thorny mesquite.

A cowboy, passing, grinned at him companionably. "Thinking about something, kid, or just lookin'?"

"I was thinking," said the tenderfoot morosely, "that in this country you have more rivers and less water, more cattle and less milk, and you can see farther and see less than in any God-forsaken country that ever lay out in the weather."

Afterward, when the tenderfoot had become as husky as any cowboy in the outfit, he looked upon the landscape with clearer vision and saw more.

On a day in March I sat with an old sheep man on the

edge of the cliffs of the Superstition Mountains. Below us, down a thousand feet, was the beautiful so-called desert, dotted not only with cacti, but with feathery palo verde trees, fat looking mesquite and ocatillas flaming with their scarlet flowers. To the west, in the distance a line of green marked the beginning of the alfalfa fields of the Salt River Valley; off to the south and southwest was the fertile valley of the Gila.

At the base of the cliff beneath us, scattered in bunches among the shrubbery, was a flock of a thousand ewes accompanied by more than a thousand fortnight-old lambs. Seasonal rains had brought up the spring herbage, and although it was too far away to take in details we knew the flock was in prime condition.

The old man's kindly, weather-beaten face, about the color of saddle leather, lighted with interest as he looked down upon his charges. "Look pretty good, don't they?" he said.

I assented. "They are fattening your bank account as well as their sides."

The old man shook his head. "That's all right, too, though I didn't mean it just that-a-way. I was thinkin' about the picture they make. See how they bunch themselves among the greasewood and palo verdes—the gray sort of settin' off the green! Makes me think of white clouds agin a blue sky. Little like a painting I once seed in an art gallery in Santa Fe, only this is the real thing."

He eased himself against a bowlder.

"Runnin' sheep is the oldest business in the world. Did you ever stop to think that Old Adam and Eve might never have made things go if Abel hadn't gone in for wool and

mutton? Sheep could pretty near feed and clothe a whole country now if they had to.

"Used to be a lot of prejudice, though, here in the West agin sheep and sheep-men. Reckon some of it was deserved, but not all of it. If the sheep overfed and spoiled a lot of range, cattle did, too, and it don't make anything to the credit of the cattle-men that sheep grazed closer than cattle or their hoofs cut the turf out more.

"Still," he added thoughtfully, "I'm sorry for the part I had in it. It's a mighty bad thing for man to hurt God Almighty's world. Kind of figure I ran quite an overdraft in God's bank when I was younger. Been tryin' to pay it back of late years—buildin' up instead of tearin' down. Ever see my alfalfa ranch on Queen Creek? Fine as any you ever seed. Made it out of the desert myself. Sunk a well—smote the rock, as you might say, like old man Moses, and the Lord gave me water. There it is agin," he went on, "the God that made all this country always ready to take us into partnership in fixing it up useful to our needs, we puttin' in our little brains and muscle agin his capital.

"My boys are builders-up, too. Right now Joe's workin' at the Horse Mesa plant creating electricity through water power. Jimmy is with the Forestry Service planting pine trees in a burnt-out section. Tom's digging irrigatin' canals on the Gila. Eddy, the youngest, is going to pick up the electricity Joe's power house generates and pump water with it for a date orchard down on the Agua Fria."

A reminiscent light came in his eyes. "When I was a kid my school teacher told me quite a yarn once about a fellow by the name of Aladdin, off in Asia some place, who had a

lamp that when he rubbed it one of them magic-workin' Jinns came and slaved for him. You've heard it, of course. That's what we're doin' now, rubbin' our lamps, and them Jinns come and do our bid. You get the idee—we call them Water-power and Electricity, and Steam-shovels and things like that.

"Got a vice-president of a railroad stoppin' down at my house, gettin' over pneumony. Wouldn't know him for the man that come there two months ago. Sunshine, fresh air and good ranch grub is doin' it. That's better than Jinn stuff—that's God's own blessed medicine."

He gazed across the desert, silent for a moment, then he said: "Everybody in America ought to spend at least one vacation out in this country before they get too old, just to swell out their ideas and pep them up for action when they get back home." He added earnestly: "Kid"—I was fifty, but only a boy to this grizzled veteran of eighty-eight—"put in that book of yours what I've been sayin'. Tell the folks back East that old Dave Bowling sends 'em a special invite to come out and stop a spell. Tell 'em we ain't askin' them to buy real estate or mines—let the brokers drum up their own business—we just want to give 'em a good time—make 'em happy. Tell 'em this country will make 'em dream, tell 'em it will make 'em strong. Tell 'em they can't appreciate it till they see it."

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